Integrated Design - Appendix B

Open & Civic Space Design

For State Approval - Major Amendment 1 - December 2017

Contents

1 Introduction

This appendix identifies types of open and civic spaces that are expected in the region and how they should be designed and constructed. It is not intended to be a one design fits all approach but to provide a guide to achieving design principles outlined in Section 4 of the Planning scheme policy – Integrated design.

Throughout this appendix the use of the term 'should' implies that all reasonable and practicable measures must be taken to achieve the desired outcome or solution specified. The guideline is not to be regarded as prescriptive and there may be circumstances and conditions where designers will need to adopt alternative design procedures, or innovative methods, commensurate with accepted best practice.

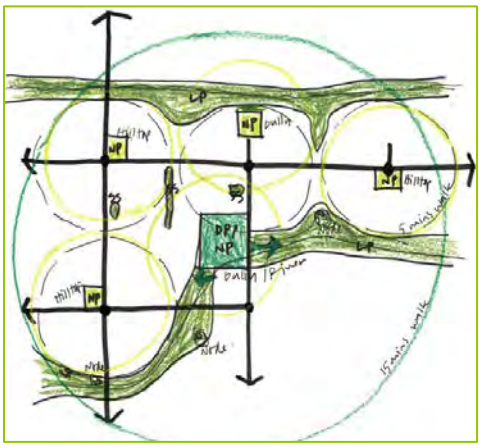
An alternative solution may be adopted provided it has an outcome or performance at least equivalent to that presented in that particular point of the guideline. Where it is not considered reasonable or practicable to achieve the outcome, the designer may be required to provide—to the satisfaction of Council—justification for the decision and how the developments achieves the design principles outlined Section 4 of the Planning scheme policy – Integrated design.

1.1 How to Use This Document

This document leads the reader though the design process for open spaces within the Moreton Bay region.

- **Section 2** outlines the broad fundamental requirements for the provision of open and civic space in the region. This section is particular useful for the planning and design of subdivisions.
- **Sections 3 to 6** provides specific detail relating to each open and civic space type, discussing the expectations and specific requirements for each open space.
- **Section 7** discusses aspects relating to the detailed design and delivery of an open and civic space projects in the region.
- **Section 8 and 9** provides important reference documents and definitions that aid the designer in delivering successful open and civic space projects in the regions.

2 General Design Requirements



Any new residential developments within the region should demonstrate the following:

Trunk Infrastructure

Any requirements identified in the *Priority Infrastructure Plan* are clearly understood and catered for in the development.

Accessibility

All proposed residential dwellings are within the accessible distance of any proposed or existing local recreation open and civic space outlined in *Table 2.1 – Accessibility Standards*.

Physical Design

All proposed open spaces achieve the minimum design requirements outlined in the relevant Open and Civic Spaces - Section 3 to 6 such as minimum size, shape and configuration.

Recreation opportunities

All proposed open and civic spaces provide the functions outlined in *Table 2.2 – Recreation Opportunities Matrix*.

Embellishment and Design Standards

All proposed open spaces meet the acceptable embellishment and design standards as outlined in Section 7.

2.1 Accessibility Standards

The accessibility standards for open and civic space are identified in Table 2.1. The standards identify open and civic space catchments and the expected geographical distribution rate across the region.

Table 2.1: Accessibility Standards

Place type	Open and Civic Space Type - Acceptable maximum distance from new developments (km)									
	Recreation					Sports		Civic		Linear Linkage Local and Natural
	Local	District	Regional	Foreshore	Bushland	District	Regional	District	Regional	
Activity Centre	0.4	2.5	10	N/A	N/A	3	15	WDC[3]	WMC[4]	N/A
Urban Neighbourhood	0.4	2.5	10	N/A	N/A	3	15	N/A	N/A	N/A
Next Generation Neighbourhood	0.4	2.5	10	N/A	N/A	3	15	N/A	N/A	N/A
Suburban Neighbourhood	0.4	2.5	10	N/A	N/A	3	15	N/A	N/A	N/A
Rural Residential	N/A	3.5	10	N/A	N/A	5	15	N/A	N/A	N/A
Rural Township	0.8	2.5	10	N/A	N/A	5	15	WDC[3]	N/A	N/A
Coastal Communities	0.8	2.5	10	N/A	N/A	5	15	WDC[3]	N/A	N/A
Rural Area	N/A	N/A	10	N/A	N/A	N/A	15	N/A	N/A	N/A
Mountain Ranges, Forests and Waterways	N/A	N/A	10	N/A	N/A	N/A	15	N/A	N/A	N/A
Key Extractive Resources	N/A	N/A	10	N/A	N/A	N/A	15	N/A	N/A	N/A
Coast and Riverland's	N/A	N/A	10	N/A	N/A	N/A	15	N/A	N/A	N/A
Enterprise and Employment Areas	N/A	3.5	10	N/A	N/A	5	15	N/A	N/A	N/A
Special Areas	N/A	N/A	10	N/A	N/A	N/A	15	N/A	N/A	N/A

Notes

1) Refer to Moreton Bay Regional Council's Strategic Framework for further information on 'Place Types'.

2) This table identifies the acceptable distance that all new residential developments should be from a particular open space type. It is calculated as actual travel distance along the road network. Local recreation type open spaces maybe calculated along pedestrian pathways. Higher order open spaces (that have similar functions to local open spaces) contribute to the accessibility of the local network. It is understood that meeting these standards may be difficult to achieve for all new residential development. A reasonable level of accessibility must be demonstrated and agreed to by Council.

Table Key

(WDC) Within District Centre
(WMC) Within Major Centre

2.2 Recreation Opportunities and Facilities

The recreation opportunities and facilities for each open space type are identified in Table 2.2.

Table 2.2: Recreation Opportunities and Facilities

Opportunities / Facilities		Open and Civic Space Type												
		Recreation							Sports		Civic		Linear Linkage	
		Local	District	Regional	Foreshore			Bushland	District	Regional	District	Regional	Local	Natural
					Local	District	Regional							
Play areas	Large	✗	✓✓	✓✓	-	-	-	✗	-	✓	✗	-	✗	
	Small	✓✓	-	✓	-	-	-	-	✓	✓✓	-	✓	-	
Cycling & walking opportunities		✓	✓✓	✓✓	✓	✓	✓	✓	✓	✓✓	-	-	✓✓	
Seating opportunities		✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓✓	✓✓	✓✓	✓✓	✓✓	
Kick-a-bout spaces		✓✓	✓✓	✓✓	✓	✓	✓	✓	✓	✓	-	-	-	
Picnic areas		✓✓	✓✓	✓✓	✓	✓	✓	✓	✓	✓✓	-	-	-	
Multi-use activity space		✓	✓✓	✓✓	-	-	-	-	✓	✓	-	-	-	
Youth activity space		-	✓	✓	-	-	-	-	-	-	-	-	-	
Gateway statement (public art)		-	✓	✓✓	-	-	-	-	-	-	✓	✓	-	
BMX / skate opportunities		-	✓	✓✓	-	-	-	-	-	-	-	-	-	
Dog off leash		✗	✓	✓✓	-	-	-	-	-	-	✗	✗	-	
Fitness nodes		-	✓	✓✓	✓	✓	✓	-	-	✓	✗	✗	✓	
Refreshment facilities (drink taps)		✓✓	✓✓	✓✓	-	-	-	✓	✓✓	✓✓	✓✓	✓✓	-	
Public amenities (toilets)		✗	✓✓	✓✓	-	-	-	-	✓✓	✓✓	-	✓	-	
Performance / community / festival / event space		-	-	✓✓	-	-	-	-	-	-	✓	✓	-	
Kiosks or other commercial opportunities (café & restaurants)		✗	-	✓	-	-	-	✗	✓	✓	✓	✓	-	
Formal sports fields / courts / surface (lighting & irrigation)		✗	✗	✗	✗	✗	✗	✗	✓✓	✓✓	✗	✗	✗	
Change facilities (sports)		✗	✗	✗	✗	✗	✗	✗	✓✓	✓✓	✗	-	✗	
Private vehicle movement and internal parking		✗	✓	✓✓	-	-	-	-	✓✓	✓✓	✗	✗	✗	
Access to nature (bird watching, boardwalks etc.)		-	-	-	-	-	-	✓	-	-	✗	✗	-	
Outdoor recreation (bushwalking, horse riding etc.)		✗	-	-	-	-	-	✓	-	-	-	✗	✗	
Paddle and recreational boating facilities		-	-	-	-	-	-	-	-	-	✗	✗	-	
Beach facilities (beach showers etc.)		✗	✗	✗	-	-	-	✗	✗	✗	✗	✗	✗	
BBQs		X	✓✓	✓✓	✓✓	✓✓	✓✓	X	X	✓✓	X	✓✓	X	
Bus parking / drop off		X	X	✓	X	X	X	X	✓✓	✓✓	X	✓✓	X	

Table Key

✓✓ Required ✓ Preferred - Optional ✗ Not Preferred

3 Recreation Open Space

3.1 General

Recreation open spaces are designed to meet a range of traditional and passive recreation activities of the community. Seven types are catered for in the region as follows:

1. Local Recreation
2. District Recreation
3. Regional Recreation
4. Local Foreshore Recreation
5. District Foreshore Recreation
6. Regional Foreshore Recreation
7. Bushland Recreation

Refer to the *Glossary - Section 9* for further clarification on each type.

3.1.1 Design Guidelines for Recreation Open Space

Table 3.1 below and the following guidelines provide further guidance on the design requirements for recreation open space.

Table 3.1: Specific Provision for Recreation Open Space

Open space type	Population range[1]	Min. area – acceptable level of constrained land[2]	Width to depth ratio	Min. width at any point	Min. road frontage	Road type[3]	Min no. of access points[4]	Min. land above 2% AEP (1 in 50 year ARI) event
Local Recreation	1000-1500	0.5 Ha – 0% (Preferred size = 1.0 Ha)	0.5	20m	40%	Collector or lower	1	100%
District Recreation	5000-8000	4 Ha - 20%	0.75	30m	30%	Collector or higher	2	80%, all internal roads and car parking
Regional Recreation	40,000+	10 Ha - 50%	0.75	30m	30%	Arterial or higher	3	50%, all formal recreation areas, internal roads and vehicle parking
Local Foreshore Recreation	No Standard	No Standard	No Standard	No Standard	No Standard	No Standard	1	all formal recreation areas, internal roads and vehicle parking
District Foreshore Recreation	No Standard	No Standard	No Standard	No Standard	No Standard	Collector or higher	2	all formal recreation areas, internal roads and vehicle parking
Regional Foreshore Recreation	No Standard	No Standard	No Standard	No Standard	No Standard	Collector or higher	2	all formal recreation areas, internal roads and vehicle parking
Bushland Recreation	No Standard	No Standard	No Standard	No Standard	No Standard	No Standard	1	all formal recreation areas, internal roads and vehicle parking

Notes

1) This is the estimated population size that warrants a particular park type.
2) This is the minimum area that can provide the desired function for each park type. A larger park size may be provided to accommodate high density areas and to meet the broad hectare supply ratios. The acceptable level of constrained land only applies to the minimum area not the total park.
3) Parks should be located on acceptable road type to complement the parks role and function in the community and in the overall open space network.
4) Suitable for maintenance and emergency vehicle access.

a) Access, location and connectivity:
   i) The accessibility standards are to be in accordance with Table 2.1.
   ii) Recreation parks are to be located in a central, prominent, highly visible and accessible location in the catchment it services.
   iii) Pathway connections are to be shared use, accommodate varying levels of mobility and provide an internal loop that connects activity nodes within the parklands. Lighting is to be provided on trunk pathways.
   iv) Adjacent land uses are to complement the park and provide a physical and visual interface such as direct residential dwelling frontage access.

v) Signage is to be provided in key locations to promote legibility of the space and enhance wayfinding within the locality.
vi) District and regional recreation parks are to be serviced by public transport and where possible should have dedicated public transport stops, as well as adequate off road parking.

b) Physical design:
i) Recreation parks are to have a regular and compact shape that can accommodate the recreation opportunities identified in Table 2.2.
ii) Open spaces are to be reasonably level throughout, in order to accommodate provision of core infrastructure, however natural or constrained areas may have undulating terrain to provide relief in the landscape. Table 3.2 provides acceptable gradients for specific facilities.

Table 3.2: Acceptable Gradients for Specific Opportunities in Recreation Open Space

Opportunity / Facility	Acceptable Gradient
Kick-a-bout space	1% to 3%
Terraced and sitting areas	1% to 2%

c) Character, cultural and natural design elements:
i) Significant natural and cultural features are to be retained and promoted in park design when conducive to setting and function, particularly where required by legislation such as those features identified in the Register of Heritage Places or governed by Cultural heritage provisions.
ii) Public art is encouraged and provided in civic/community areas, gateway spaces or in play space as interactive play. Public art should be durable and resistant to vandalism.
iii) Interpretive signage is provided when cultural and environmental features are present.
iv) WSUD elements may be included in the landscaping so that it does not interfere with the functionality of the park and or be at the expense of recreation activities.
v) Key viewpoints are retained and promoted. Views into and external to the park are important in maintaining and promoting sense of place.

d) Safety and security:
i) CPTED principles are used to guide the design and location of infrastructure.
ii) Playgrounds are to be located at least 10 metres from private dwellings and 20 metres from external roads.
iii) Bollards, slip rails, vegetation and other measures are to be used to deter unauthorised vehicle access in parks. These should be able to be removed for the purposes of Council access and maintenance purposes.
iv) Landscaping is used to delineate recreational activities, activity nodes, private and public spaces and allow surveillance.
v) Vegetation features do not block views to and from the main activity areas and play equipment.

e) User comfort:
i) Public amenities, where consistent with the park classification, are provided and located close to key locations which are easily accessible.
ii) Dog off leash areas are to be designed in a regular and uniform shape, located at least 30 metres from water bodies and 20 metres from recreation areas.
iii) Passive recreation nodes are provided in areas which allow for sitting and nature appreciation.
iv) Kiosks, restaurants, community facilities, sporting facilities and cafes may be utilised in regional and district recreation parks to activate the space.
v) Shade and shelter is provided that maximises user comfort including adequate cover of pathways, play spaces and formal seating areas.

4 Sports Open Space

4.1 General

Sports open spaces are traditionally used for playing and practising formal, organised and competitive sporting activities. They include sports grounds used for a wide range of team and individual competitions and often have associated facilities such as change rooms and spectator areas. Typical infrastructure includes irrigated sports surfaces, hard courts, cycle tracks and jumps, indoor sports centres, athletics tracks and stations, fitness stations and walking tracks. They are to also include necessary ancillary infrastructure such as competition and training lighting, clubhouses, public toilets, change rooms, storage rooms/areas, shade, spectator seating, drink fountains, litter bins, internal road network and parking facilities, signage, play equipment, informal kick-about areas and water harvesting for on-site re-use.

In most locations sports open spaces are to be multi-use and promote the shared use of facilities between a number of clubs and sporting codes. Some informal recreation opportunities may also be provided for visitors and local residents to encourage use of the park outside of formal sporting hours or for families attending sporting events. It is intended that sports parks are to be developed in accordance with a master plan of development.

There are typically two types of sports facilities planned for in the region. They are:

1. District Sports
2. Regional Sports

Refer to the *Glossary – Section 9* for further clarification on each type.

4.1.1 Design Guidelines for Sports Open Space

Table 4.1 and the following guidelines provide further guidance on the design requirements for sports open space.

Table 4.1: Specific Provision for Sports Open Space

Open space type	Population range[1]	Min. area – acceptable level of constrained land[2]	No. of access points[3]	Features above 1% AEP (1 in 100 year ARI) event	Features above 2% AEP (1 in 50 year ARI) event	Features above 5% AEP (1 in 20 year ARI) event
District Sport	30,000+	20 Ha – 20%	All playing fields/courts have adequate access	Buildings	Formal recreation areas, internal roads, hard courts and vehicle parking	Playing fields
Regional Sport	100,000+	40 Ha – 30%	All playing fields/courts have adequate access	Buildings	Formal recreation areas, internal roads, hard courts and vehicle parking	Playing fields

a) Access, location and connectivity:
   i) The accessibility standards are to be in accordance with Table 2.1.
   ii) Sport parks are to be generally accessible by public transport, bikeways and major roads and provide adequate vehicle parking.
   iii) Park design is to include well-defined internal pedestrian and vehicle access.
   iv) The location of formalised sporting activity must have minimal impact on residential amenity, located close to public transport stops and provide adequate off road parking.
   v) Park design should consider maintenance requirements in accordance with future asset management plans.

b) Physical design:
   i) Sport parks are to have a square or of a similar compact overall shape that is reasonably flat throughout.
   ii) Sport parks are to utilise a number of multi-use fields of 200 x 150 metres with a slope of <1:70.
   iii) Fields are to be set back a safe and suitable distance from external roads or provide appropriate buffers and measures to ensure conflict between park use and vehicles is minimised.
   iv) Outdoor sporting fields and courts, where practical, are to be oriented in a north-south direction along the long axis.
   v) Playing surfaces need to be irrigated and well drained. Water sources must be suitable to meet the irrigation needs of the field for the long term.

c) Character, cultural and natural design elements:
   i) Sport parks are to accommodate a range of formal and informal recreation activities and picnic and barbeque facilities.
   ii) Sport parks are to retain natural vegetation and other significant features where compatible with the function of the park.
   iii) Sport parks are to provide appropriate buffering vegetation to reduce visual impact of facilities without compromising CPTED principles and casual surveillance from adjacent residential lots and public areas.
   iv) WSUD elements are to be included in landscaping so that it does not interfere with the functionality of the park and or be at the expense of sporting activities.

d) Safety and security:
   i) CPTED principles are used to guide the design and location of facilities.
   ii) Vegetation features do not block views to and from the main activity areas and play equipment.
   iii) Bollards, slip rails, vegetation and other measures are to be used to deter unauthorised vehicle access in parks. These should be able to be removed in designated locations to enable Council access for maintenance purposes.

e) User comfort:
   i) Adequate shade and shelter is provided over spectator areas, play facilities, car parking and pathway connections to and from facilities.

5 Civic Spaces

5.1 General

Civic spaces are located in activity centres and offer residential users, visitors and employees an informal recreation space in an urban setting. Civic spaces are to be sited in a prominent, central location with a high level of pedestrian accessibility. Given the urban context and location, the park will focus on providing spaces for people to socialise, sit and enjoy the subtropical climate. A variety of colours, textures and public art is to be used to create a sense of place and identity in civic parks. Adjoining land use activities are to contribute to activating the edge and provide casual surveillance. Signage is also to be incorporated into the park design to allow legibility and activation of the space.

There are typically two types of civic spaces planned for in the region. They are:

1. District Civic
2. Regional Civic

Note: Civic Spaces should be located in accordance with a master or concept plan.

Refer to the *Glossary – Section 9* for further clarification on each type.

5.1.1 Design Guidelines for Civic Spaces

Table 5.1 and the following guidelines provide further guidance on the design requirements for civic space.

Table 5.1: Specific Provision for Civic Spaces

Open space type	Location	Min. area – acceptable level of constrained land(1)	Min. road frontage	No. of access points(2)	Min. land above 1% AEP (1 in 100 year ARI) event
District Civic	District commercial centres	1,000m^2 – 0%	30%	1	100%
Regional Civic	Major commercial centres	6,000m^2 – 0%	40%	1	100%

a) Access, location and connectivity:
   ii) Civic space is to be located in prominent, highly visible, universally accessible and central locations.
   iii) Signage is provided in key locations to promote legibility of the space.
   iv) Adjacent land uses complement the park and provide a physical and visual interface.

b) Physical design
   i) Civic parks are to have a regular and compact shape that can accommodate the recreation opportunities identified in Table 2.1.
   ii) Civic parks are to have sufficient flat spaces to enable practical use, however it is recognised that open space may also enable transition between areas at different elevation using universal access provision.
   iii) The open space is to be reasonably flat throughout. Table 5.2 provides acceptable gradients for specific facilities.

Table 5.2: Acceptable Gradients for Specific Opportunities in Civic Type Space

Opportunity / Facility	Acceptable Gradient
Terraced and sitting areas	1% to 2%

c) Character, cultural and natural design elements:

i) Civic parks take advantage of terrain and include significant landmarks such as large shade trees and features with heritage value where they occur onsite, or retain vistas to significant landscape features where external to the site.
ii) Public art is encouraged and provided in civic areas or in play spaces as interactive play.
iii) WSUD elements are to be included in landscaping so that it does not interfere with the functionality of the park.

d) Safety and security:
i) CPTED principles are used to guide the design and location of infrastructure.
ii) Playgrounds are to be located at least 10 metres from private dwellings or shop fronts, and 20 metres from external roads.
iii) Landscaping is used to delineate recreational activities, activity nodes, private and public spaces and allow surveillance.
iv) Vegetation features are not to block views to and from the main activity areas and play equipment.
v) Bollards, slip rails, vegetation and other measures are to be used to deter unauthorised vehicle access in parks. These should be able to be removed in designated locations to enable Council access for maintenance purposes.

e) User comfort:
i) Public amenities are to be provided and located close to key locations which are easily accessible.
ii) Adequate shade and shelter is provided that maximises user comfort.

6 Linear Linkage Open Spaces

6.1 General

Linear linkage open spaces include areas of connected or continuous green space that are elongated in shape and form links between key destinations within the open and civic space network. These parks may have multiple purposes which may include contributing to the conservation of habitat and scenic areas, facilitate walking and cycling corridors, serving floodway and drainage functions, and protecting water quality.

There are typically two types of linear linkages open spaces planned for in the region. They are:

1. Urban Linear Linkage
2. Natural Linear Linkage

Note: Linear linkages should be located in accordance with a master or concept plan.

Refer to the *Glossary – Section 9* for further clarification on each type.

6.1.1 Design Guidelines for Linear Linkage Open Spaces

Table 6.1 and the following guidelines provide further guidance on the design requirements for linear linkage type open space.

Table 6.1: Specific Provision for Linear Linkage Type Space

Open space type	Average min. width	Min. road frontage	No. of access points[1]	Features above 2% AEP (1 in 50 year ARI) event	Features above 5% AEP (1 in 20 year ARI) event
Urban Linear Linkage	15m	40%	Where required	All structures	Pathways
Natural Linear Linkage	30m	40%	Where required	All structures	Pathways

a) Access, location and connectivity:
   i) Pathway connections are to be shared use and accommodate varying levels of mobility.
   ii) Adjacent land uses are to complement the park and provide a physical and visual interface such as direct residential dwelling frontage access.
   iii) Signage and landmarks are to be provided in key locations within the park to promote legibility of the space.

b) Physical design:
   i) Parks are to be a linear shape and reasonably flat to accommodate pathways and recreation spaces.

c) Character, cultural and natural design elements.
   i) Native vegetation is to be retained and integrated into design.
   ii) Parks are to protect and enhance landscape amenity and environmental values through linkages.
   iii) Interpretive signage is provided when cultural and environmental features are present.
   iv) WSUD elements are to be included in landscaping so that it does not interfere with the function of the park.

d) Safety and security:
   i) CPTED principles are used to guide design and location of infrastructure and activity nodes.
   ii) If provided, playgrounds are to be located at least 10 metres from private property boundary and 20 metres from external roads.
   iii) Landscaping is used to delineate recreational activities, activity nodes, private and public spaces and allow surveillance.
   iv) Planted vegetation is not to block views to road, pathways and play spaces.
   v) Bollards, slip rails, vegetation and other measures are to be used to deter unauthorised vehicle access in parks. These should be able to be removed in designated locations to enable Council access for maintenance purposes.

e) User comfort:
   i) Play spaces and fitness nodes may be included in design and be close to pathways.
   ii) Adequate shade and shelter is provided that maximises user comfort.
   iii) Shade should be natural where possible, with species selection to consider the distance from the activity space and potential injury from falling limbs.

7 Design and Delivery

7.1 General

The design and delivery of a successful open and civic space project cannot be accomplished by simply meeting the requirements identified earlier in this document.

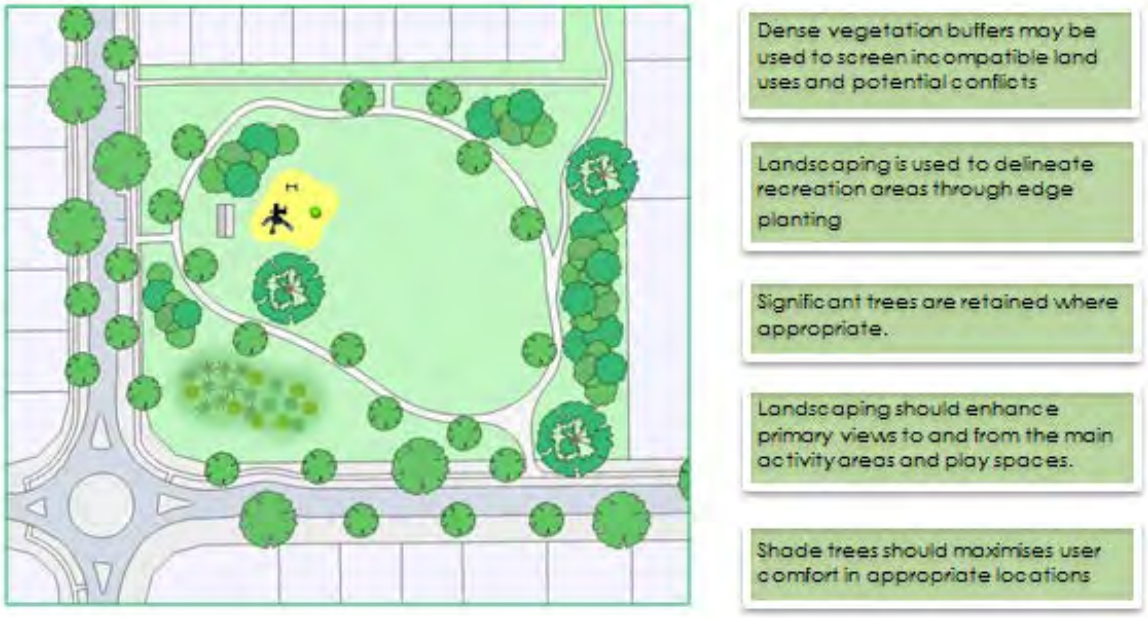


Figure 7.1 Sample Concept Design

Designs must also consider aspects relating to:

a) Unstructured play spaces and Playgrounds
b) Public Art
c) Lighting
d) Signage and Public Information
e) Furniture, Fixtures and Materials
f) Sporting Facilities
g) Landscaping and Earthworks
h) Stormwater and Water Sensitive Urban Design
i) Existing native vegetation and environmental features

Figure 7.1 identifies how these aspects can be incorporated into an open and civic space design.

The following section provides guidance on these issues.

7.1.1 Unstructured Play Spaces and Playgrounds

Playground design is to respond to the local landscape character, demographics, demands and identity, through the choice of infrastructure and colour schemes. It is also to consider the function and role the playground and parklands plays in the overall network. Playgrounds are to be safe, fun, interesting, accessible and clearly visible from the main areas of the open space.

a) The following requirements apply to playground design and delivery:

   i) Playgrounds and associated structures should be consolidated within a single node to allow for adequate adult supervision of children and to help reduce future maintenance costs. Larger parks may have several playground nodes as required.
   ii) Playgrounds are to provide adequate seating adjoining the playground under shade for supervision of play. The playground is to also have 1 bin adjacent to the playground.
   iii) Slides are installed facing south to reduce the effect of direct sunlight onto the slide surface unless otherwise shaded. Swings are to be installed facing north / south unless otherwise shaded.
   iv) Playgrounds are to have adequate separation from areas of higher hazard such as carriageways, car park areas, bikeways and water bodies. Landform, planting or fences may be used to provide separation from areas of higher hazard.
   v) Playground equipment is to comply with Workplace Health and Safety Standards, Australian Standards AS 4685 parts 1, 2, 3, 4, 5 and 6, ASNZS 4422, ASNZ 4486.1 and all other relevant statutory requirements, guidelines and standards.
   vi) Playgrounds are to contain adequate subsurface and surface drainage to avoid water ponding / nuisance. A brass marker “D” should be fitted to each side of edging to indicate position of drainage pipes.
   vii) If geofabric is installed, the matting must be secured with small cable ties or some other approved measures on all joins and around elements to ensure that the matting does not rise to the surface and create a trip hazard and ongoing maintenance issue.
   viii) The assembly of all playground equipment using nuts and bolts are to have thread lock applied so that bolts do not work their way loose and cause maintenance issues and damage to equipment.
   ix) Playgrounds are to have rubberised or synthetic softfall under play equipment where displacement of softfall mulches is likely to occur. Softfall depth must comply with AS 4422. Consideration is to be given regarding fall zone softfall displacement under swings, fire poles and exit run-out for slides, Spica and rotating elements, carousels or spinning discs etc.
   x) Playgrounds are to be surrounded with an edge treatment and have a minimum fall zone in compliance with AS 4685 & 4422 as a minimum or manufacturers recommendation if these exceed minimum requirements in Australian Standards.
   xi) In cases where timber sleepers are used as footprint edging then a treatment of Synpave acrylic topcoat Terracotta non-slip/splinter containment paint is to be applied to manufacturer’s instructions, with a minimum of 2 coats. Concrete edging shall be 200mm deep and 150mm wide with rolled edge.
   xii) Where shade trees are in close proximity at mature size, the developer is to ensure that the trees are adequately protected in accordance with AS4970. The protection of trees on development sites must ensure that tree roots do not compromise the softfall or create trip hazards in the fall zone.

b) The developer is to submit to Council certification that the playground equipment has been designed, constructed, and installed according to the manufacturer’s specifications and is compliant with Australian Standards. Certification is to be provided by a certified playground audit or prior to “on maintenance”.

c) The developer is to hand over maintenance instructions, parts and service manuals and manufacturers’ guarantees for the playground equipment or any other documents to Council prior to acceptance “on maintenance”.

d) The developer is to provide to Council any construction or maintenance tools supplied with the purchase of the playground equipment prior to acceptance of the works “off-maintenance”.

7.1.2 Public Art

Public art is used to bring life and vitality into open and civic spaces and transform it into an attractive, unique and visually interesting place. Public art is to be designed, constructed and sited to enhance the visual amenity of the space, create a sense of place, facilitate way finding and add a social and cultural dimension to the landscape

a) Design and delivery for public art should:
   i) Achieve a scale that reflects the setting to enable all user groups to successfully appreciate the art.
   ii) Provide for the safety of users, allowing for appropriate circulation space and setback from road edges.
   iii) Be functional such as providing interesting places for people to sit.
   iv) Be constructed from materials that are resistant to vandalism.
   v) Be low maintenance and made of durable materials. The selection of materials should consider the long term availability for future renewal and maintenance requirements.
   vi) Be located along pedestrian/cycle thoroughfares, within identifiable community spaces and within areas where visibility is increased.

7.1.3 Lighting

Lighting systems are to influence the vitality and appearance of a place at night and enable legibility of space, lessen the risk of night time accidents, and discourage crime and vandalism.

a) Design and delivery for lighting in open and civic spaces is to:
   i) Be designed to minimise impact on existing and adjacent premises whilst maximising user safety and vitality of a place.
   ii) Complement and enhance the elements within a space and be incorporated into the overall design, rather than an add-on. Creative lighting is only to be used in high profile public areas.
   iii) To comply with relevant standards for lighting within pedestrian area AS/NZS 1158.3.1:2005 – Lighting for Roads and public spaces and AS 4282-1997 – Control of the obtrusive effects of outdoor lighting.
   iv) Light fittings are to be appropriate for use in public spaces such as shatter proof and cool to touch glass, durable materials such as stainless steel and brass, suitability for in-ground or exterior locations and impact resistance.
   v) Achieve a 20 year installation design life on all materials.
   vi) To be located, where possible, to minimise the risk of damage, either on a pole out of harm's way, fixed into the ground or wall, fitted into a recess or placed on the underside of furniture.
   vii) Whilst ensuring public safety is not compromised, measures to minimise or mitigate adverse impacts of artificial lighting on wildlife should be pursued in ecologically sensitive areas.
b) Prior to commencement of construction, an Operational Works development approval is to be obtained for all electrical works.

7.1.4 Signage

A clear and well thought out signage system to enable users to orientate themselves within the open and civic space in relation to location of key landmarks, buildings and pathways that are accessible to the public.

a) The planning and design of signage is to:
   i) Establish a coordinated signage network to improve legibility and provide directional information between important destinations.
   ii) Add value, where appropriate, to the signage network by including interpretive signs to education, inform and entertain users of the open space.
   iii) Be practical, easy to maintain and maintain effective communication whilst minimising visual clutter within the public realm.
   iv) Utilise modern technologies, where appropriate, such as smart phones and touch screens to enhance the user's experience of the space and improve their ability to navigate through them.

i. Signs and sign poles, stands or bases are constructed from high quality materials that require minimal ongoing maintenance. Where multiple signs are required in the same location, the signs are to be collocated on one structure where possible.

7.1.5 Furniture, Fixtures and Materials

Open and civic space furniture (including seats, bins, tables, drink fountains, bike racks etc.) is to be selected or designed so that it is accessible, comfortable, robust and simple to maintain.

a) While contextual design is to be responsive to the particular qualities that are unique to that landscape, some specific design considerations will be common to all projects. These include:

   i) Distinctiveness: materials and elements reflect the desired image or theme of an area. Distinct materials assist people to 'read' and navigate by reinforcing urban structures, common patterns, rhythms and themes of the site.
   ii) Long term availability: ensuring the materials will be readily available over the long term.
   iii) Equivalence: determining design criteria for acceptable substitutions if the preferred item is not available.
   iv) Durability: assessing the durability of an item/material and how this bears on life cycle costs. It is to be made from materials that will last and can be suitably protected from exterior elements, such as salt spray and UV exposure. Furniture items are to come with a minimum 5 year warranty on materials and workmanship.
   v) Maintenance: Infrastructure items are designed, constructed and located to minimise vandalism (including graffiti) and in areas that are easy to maintain.
   vi) Safety and Public Liability: assessing fall heights, soft fall, trip hazards etc. Infrastructure items, such as shelters, are to have building approval and be certified by a RPEQ Certified Structural Engineer.
   vii) Considerate of the environment: Infrastructure items are not located within the critical root zone or tree preservation area of habitat trees.

7.1.6 Sporting facilities

Sporting facilities are to be of a size and shape that offers flexibility and diversity for various sports and recreation activities. The design of sporting facilities is to accommodate future growth of sports and emergence of new and different sports to the area. Single use provisions are to be avoided.

a) Where relevant, the level of provision is to be consistent with Councils Sports facility demand model and reflect current research into the minimum number of playing areas to provide for viable sporting clubs and competitions. A detailed master plan is to be developed for all sport, recreation and open space facilities that are proposed as part of community infrastructure.

   Each plan must provide detail about:

   i) Linkages and connections
   ii) Access/circulation and car parking
   iii) Key components including playing fields
   iv) Pavilions and other built infrastructure
   v) Amenities
   vi) Furniture
   vii) Shelters
   viii) Lighting
   ix) Fencing
   x) Irrigation
   xi) Drainage
   xii) Landscape features
   xiii) Bus parking & manoeuvring
   xiv) Storage

b) Wherever possible, storage and maintenance facilities are to be provided within the building footprint of the main pavilion. While Council recognises the need for these facilities, it is inefficient and often unsightly for these facilities to be standalone structures.

7.1.7 Landscaping and Earthworks

Landscape design is to provide safe, attractive and functional open spaces for the residents and visitors to the region. Landscape design is also to have regard for integrity and character of the surrounding vegetation, water flows and erosion and re-establishment of native vegetation. Refer to Appendix D – Landscaping Design and Street Trees for additional information in relation to specific council requirements.

7.1.7.1 Landscaping

Landscaping design in open and civic spaces should:

a) Delineate recreational activities, activity nodes, private and public spaces and allow surveillance of the spaces.

b) Retain existing native vegetation within setting and park function to enhance ecological values.

c) Provide shade in a manner that maximises user health at activity nodes (play equipment, seating areas etc.) and give regard for peak usage times, typically mid-morning, midday and after school.

d) Have regard for and facilitate traffic management and pedestrian movement.

e) Ensure landscaping in car park areas offer high quality amenity and are designed for long term sustainability and durability.

f) Trees planted along pedestrian/cycle corridors will have regard for the growth requirements of the tree from infancy to maturity.

g) Planting along park frontages is to be designed to include vehicle exclusion into mulched areas.

h) Newly established groups of trees in grassed/turfed areas are placed in mulched garden planting beds to reduce post maintenance requirements should have a minimum distance of 2m between the edges of adjacent mulch rings or hard surfaces.

7.1.7.2 Earth Works & Retaining Walls

Earth works and retaining walls in open and civic spaces should:

a) Be designed to consider:

   i) the natural topographical features of the site;
   ii) short and long-term slope stability;
   iii) soft or compressible foundation soils;
   iv) reactive soils;
   v) low density or potentially collapsing soils;
   vi) existing fill and soil contamination that may exist on-site;
   vii) the stability and maintenance of steep rock slopes and batters;
   viii) the visual impact of the excavation (cut) and fill and impacts on the amenity of adjoining lots (e.g. residential).

b) Batter slopes from level ground through to ground sloped up to a 1 in 4 gradient can be turfed or have an approved landscape planting treatment. Transitions need to accommodate Council's mowing equipment to avoid scalping.

c) Batter slopes between 1 in 4 and 1 in 3 gradient shall have an approved landscape planting treatment and must be designed to cater for safe access by maintenance staff.

d) Batter slopes steeper than 1 in 3 gradient shall not be approved unless otherwise specifically confirmed in writing by Council. Any application for approval by Council must demonstrate that the batter treatment will be constructed with an agreed "no maintenance" landscape design as maintenance staff will not be able to maintain these slopes due to WH&S limitations.

e) Grassed batters or embankments in Crown Land intended to be mown by wheeled equipment that fall below the level of a formed road are profiled to enable access to the bottom of the bank for ride on mowing equipment. The access strip at the toe of the mown bank is to be a minimum width of 3.0m with adequate turn around provision.

f) Stabilisation of batters may be achieved through the use of hydro mulching, stabilisation netting, erosion protection or engineering approved retention e.g. benching, the use of retaining walls and terracing with planting.

g) Batters that are to be planted or grassed are to be cultivated on horizontal grades to a minimum depth of 100mm with a high organic topsoil mix cultivated into the soil structure. Green couch is to be used as the dominant grass species. The batters may also be hydro mulched or planted if practical.

h) The toe of any batters and associated drainage are to be contained within the boundaries of the site and are not extended onto neighbouring lands or into adjoining vegetation protection zones.

i) All retaining walls over a metre high must be designed, specified, inspected and certified by a RPEQ Structural Engineer.

j) Retaining wall surfaces prone to unsightly graffiti will be required to be coated with an anti-graffiti material or screened with appropriate planting.

k) Retaining walls supporting private property at the boundary of public open space must be designed to accommodate pedestrian access at the toe or top of the wall for the purposes of maintenance and fire risk management. This access strip will be at least 600mm in width and have a maximum cross fall of 20%.

7.1.7.3 Edging

Edging in open and civic spaces should be:

a) Concrete or spaded edges may only be installed in linear/ linkage parks, bushland recreation reserves and sporting facilities. These edges must be constructed in accordance with the following:

   i) The maximum mown gradient above the edge must not exceed 10% so that repeated mowing to the edge will not compromise the edge or the stability of the mower.

b) Designed with smooth navigable lines and must be able to accommodate the operational characteristics of mowers and maintenance vehicles. Inward facing 90 degree of sharper corners are not permitted.

c) At garden and turf interfaces, edging is to finish flush so that mowing obstacles and trip hazards are not created.

d) Constructed from materials other than timber.

7.1.7.4 Stabilisation methods

Stabilisation methods in open and civic spaces for should:

a) Turf

   i) Only A grade turf is to be used unless otherwise approved by Council.

   ii) Turf is to be laid with edges butted up and is to be rolled into topsoil after watering.

   iii) Where turf is to be laid against a flush mount mowing edge, kerb or path, topsoil is to be levelled at 15mm below the hard edge.

   iv) Narrow turf strips between back of curb and footpaths is to be avoided in high traffic flow areas.

b) Hydro-mulching

   i) Additives of local native tree, shrub and ground cover species are to be used in seed mixes on steep gradients to assist in preventing erosion.

   ii) Areas proposed for hydro-mulching will be provided with adequate soil volumes for satisfactory post-germination establishment.

   iii) A minimum germination rate of 70% of native mix with no weed incursion is required to be achieved before on-maintenance is granted.

c) Grass seeding

   i) All seeded areas are to be prepared to achieve significant germination within the required timeframe. Grass seeding is to use a minimum rate of 1kg/ 100m2 consisting of a mix of the following:

      A) Jap Millet (Summer), Winter Rye (Winter) – 50%
      B) Unhulled Couch – 20%
      C) Hulled Couch – 30%

d) Staking

i) All staking and ties are to be removed prior to the off-maintenance inspection. Any plant material unable to be self-supporting consistent with appropriate form and vigor is to be reduction pruned or removed and replaced. Plants displaying weakness or failure in root system are to be replaced.

e) Top Soil

i) Use of site stripped topsoil is favoured where it can be removed from the top horizon and is free from litter, weed propagules, contaminates and rocks larger than 20mm in diameter and comply with AS4419. If the required quantity of site topsoil is unavailable, imported topsoil conforming to AS4419 is to be incorporated and blended with site topsoil to achieve a healthy and active growing medium. Imported topsoil is to be similar to naturally occurring local topsoil and suitable for the establishment and ongoing viability of the selected vegetation, free of weed propagules and contaminants.

f) Hard Surfacing:

i) All hard surfacing is to comply with current Australian Standards for surface treatments.

ii) The selection and design of new hard surfacing considers the following:

A) *Loading* – the hard surfacing is capable of supporting the volume and weight of expected traffic.
B) *Durability* - long term sustainability requirements such as the rate of wear and tear and susceptibility to discolouration.
C) *Maintenance costs and long term maintenance requirements* - aesthetic appeal, function, safety aspects, laying cost, availability for replacement and long term maintenance requirements need to also be addressed.
D) *Design for resistance to heaving by tree roots* – additional reinforcing, deformable cushioning, rat walls, bridge beaming or flexible paving surfaces such as rubber epoxy compounds.
E) *Vegetation protection* – porous pavements are used when hard surfacing is required around mature trees. In high intensity urban areas, where trees are installed in hard surface areas, the use of porous pavement over gapgraded subgrades is mandatory.
F) *Ease of movement for users* –pedestrians, wheelchair users and people with mobility constraints require a surface that is comfortable and functional.

For further details regarding landscaping design, including planting details and species refer to Appendix D – Landscape Design and Street Trees.

7.1.8 Stormwater and Water Sensitive Urban Design

Stormwater management within open spaces is to implement water sensitive urban design best practice where appropriate. Water sensitive urban design in open spaces is to improve flood control, improve water quality, provide diversity, promote amenity and encourage social interaction.

a) Stormwater management in open and civic spaces are to be designed to:

i) Fulfil a range of functions (aesthetic, environmental, recreational, microclimatic etc.).
ii) Not interfere with the functionality of the park and or be at the expense of recreational activities in terms of size, slope and surface.
iii) Open and civic space design maximise areas of turf, garden beds and pervious paving types.
iv) Rapidly recover from inundation, particularly for playing surfaces.
v) Be designed to be attractive and allow for social interaction and interpretation when appropriate. It is to incorporate natural features and materials to create a natural appearance and where possible rehabilitate degraded areas.
vi) Protect existing conservation features and values.
vii) Be sufficiently safe in terms of the duration, depth and velocity of any inundation.
viii) Prevent algal blooms, turbidity, pest animals (e.g. Ibis management) and promote natural biodiversity.
ix) Consider the long term maintenance implications and costs. Plantings and lawn areas are designed to not require permanent irrigation.

For further information regarding WSUD see Appendix C - Stormwater management.

7.1.9 Natural Environmental Values

Environmentally sensitive landscapes adjoining residential areas provide important inter-urban breaks and have high social and ecological values. Consideration needs to be given to appropriate design and maintenance approaches that allow them to be integrated into the wider open space network. Natural areas need to have suitable maintenance access provided and be buffered from proposed infrastructure.

a) Specific design considerations include:

   i) Guided access such as fences, gates, signage and paths and boardwalks.
   ii) Practical means of protection for native wildlife.
   iii) Weed prevention and eradication.
   iv) Groundwater control and drainage design.

Legislative obligations for protection and environmental management need to be considered before site planning and design to achieve a balance between environmental and recreational values.

For further details regarding environmental values or conservation open spaces refer to Planning scheme policy – Environmental areas and corridors.

8 Design Toolbox

This section provides a list references to sources of further detailed design information for development within the Moreton Bay region relating to the design of open spaces.

8.1 Policies, Standards and Guidelines

a) Recreational Trail Construction Guidelines
b) Dog Off Leash Area Planning and Design Guidelines
c) Moreton Bay Regional Council's Standard Drawings – Appendix H.

8.2 Best Practice Design Guidelines and Standards

a) WSUD Multiple Uses of Open Spaces Discussion Paper 2010 (WBD)
b) Crime Prevention through Environmental Design – Guideline for Queensland 2007(QLD Gov.)
c) Open Space for Recreation and Sport – Planning Principles "A guide for Local Government", Sport and Recreation Queensland 1998.
d) Open Space for Recreation and Sport – Implementation Notes for the Planning Principles for Local Government Draft Report Nov 2002.
e) SEQROC Issues Paper – Planning for Recreation and Sport in 2021.
f) Healthy by Design – A Planners Guide to Environments for Active Living – 2004 (National Heart Foundation)
g) Supportive Environments for Physical Activity (National Heart Foundation)
h) Sport Dimensions for Playing Areas – 2008 (WA Gov.)

9 Glossary

Active recreation: Opportunities for physical activity such as informal sports, jogging and playground activity.

Constrained land: Includes land which restricts the ability of the park to fulfil its role within the open space network. This includes land which is compromised by any of the following constraints:

a) The land is located below the flood level resulting from runoff from a 2% AEP event (1 in 50 year ARI event); or
b) the land is not developable under environmentally related restrictions such as the Vegetation Management Act 1999 and Vegetation Management Regulation 2012, or relating to coastal protection or koala conservation; or
c) the land contains stormwater management infrastructure unless specifically agreed upon by Council; or
d) the land is located within a registered easement for the provision of power transmission links or other purposes that the local government determines similarly constrains the use of the land; or
e) the land is required for attenuation of noise pursuant to applicable legislative provisions, guidelines and to satisfy a condition of development approval given over the land; or
f) the land exhibits a slope greater that 25%; or the land is otherwise constrained as determined by the local government.

CPTED: Crime Prevention Through Environmental Design, through elements such as casual surveillance, design, lighting and way finding.

Fitness node: A location with outdoor fitness equipment with suitable soft fall. Equipment may be designed as part of a suite of workout combinations in a consolidated location or along a linear route.

Gateway statement: The primary pedestrian entrance point, designed to improve legibility, increase way finding opportunities and define the park. The space may have hardened surfaces, free seating, landscaping and public art.

Kick-a-bout space: A flat turfed oval or rectangular area which would facilitate informal ball games.

Multi-use activity space: A space for sports, games and gathering, typically a full or half court sized pitch with multi-goal.

Passive recreation: Opportunities for relaxing, sitting, socialising and nature appreciation in a natural setting.

Performance/community/festival/event space: A location which provides an opportunity to stage various events. They include paved areas, seating, stages and other infrastructure to facilitate expected uses. It should be designed in response to setting and context.

Picnic area: A location which provides at a minimum a shelter, picnic setting, and seating. In higher order parks, BBQs are only to be provided in accordance with Table 2.2

Play area (large): A 50m x 50m flat area which contains a variety of play equipment. The area is to have a suitable soft fall and provide a variety of play experiences suited to a range of ages and abilities.

Play area (small): A 20m x 20m area which contains play equipment with suitable soft fall. This area is to contain a set of play equipment which is tailored to meet a range of ages and abilities.

Social gathering spaces: A space which include opportunities for social interaction. This may include shaded locations for people to sit and socialise.

WSUD: Water sensitive urban design, requiring integration of the urban water cycle into urban design to minimise environmental degradation and improve aesthetic and recreational appeal.

Youth activity space: A location that may include hangout nodes (small socialising spaces), activity trails, art elements, skateable elements and other appropriate spaces for youth orientated activities.

Park Type	Description	Level of Embellishment (The provided embellishment standards are to be used as a guide only)
Local Recreation	Local recreation type open spaces provide informal passive and active recreation opportunities for a residential neighbourhood. People can expect to walk safely and easily to access a local recreation open space. They offer informal recreational experiences such as ball games, picnicking and meeting friends. Local recreation type open spaces provide an important focal point for social interaction and should enhance the landscape amenity and biodiversity values of the local area. These open spaces are developed to a basic standard and generally contain a basic range of park facilities.	• Small play equipment (1x) • Softfall (400 m2) • Playground edging (80 LM) • Multi-use space (1x) • Small Shelter (2x) • Picnic setting (2x) • Pathway connections 2m wide (250 LM) • Seating (2x) • Tap/bubbler incl. meter (1x) +take off point • Bin (2x) including installation • Park name sign (1x) • Landscaping (400 m2) • Shade trees (20x) 45L Pot Large Shade trees (20x) 100L Pot • Bollards at 1.5m around the perimeter • Slip rail (1x) • Topsoiling and turf (5000 m2) • Earthworks/drainage including suitable kick-a-bout area
District Recreation	District recreation type open spaces support the social, cultural, leisure and recreational needs of district catchment or a number of residential neighbourhoods. These parks provide a diverse range of facilities and spaces in a variety of settings to cater for large numbers of people. District parks provide opportunities for all age groups and are easily accessed by active, public and private transport options. Parks are developed to a high standard.	• Large play equipment (1x) • Softfall (500m2) • Playground edging (280 LM) • Multi-use space (1x) • Shelter – small (5x) • Shelter – large (3x) • Electric BBQ including installation (3x) • Picnic setting (8x) • Public toilet (1x) • Bikeway/pathway connections 2m wide (650 LM) • Dog off-leash area (1x) • Seating (15x) • Bike rack (2x) • Tap/bubbler incl. meter + take off point (3x) • Bin – including installation(6x) • Park signage (2x) • Park entrance statement (1x) • Landscaping (1000 m2) • Shade trees – 100L (200x) • Bollards at 1.5m around the perimeter • Slip rail (2x) • Topsoiling and turf (10,000m2) • Car park spaces (40x) • Access road (1x) • Electrical works incl. park lighting (1x) Earthworks/drainage including suitable kick-a-bout area
Regional Recreation	Regional recreation type open spaces support the social, cultural, leisure and recreational needs of a regional catchment. Regional recreation parks are the highest standard of recreation park and are intended to be designed as destinations which highlight the region's unique cultural, environmental or landscape values. These open spaces should provide a diverse range of facilities and spaces in a variety of settings to cater for very large numbers of people. Open spaces should also be able to facilitate large community events and provide opportunities for all age groups and levels of ability. Regional recreation type	• Large play equipment (1x) • Softfall (800m2) • Playground edging (480 LM) • Multi-use space (2x) • Shelter – small (5x) • Shelter – large (8x) • Electric BBQ including installation (6x) • Picnic setting (24x) • Bin – including installation(10x) • Park signage (2x) • Park entrance statement (1x) • Event spaces/structure incl. earthworks (1x) • Landscaping (25,000 m2) • Shade trees – 100L (500x) • Bollards at 1.5m around the perimeter • Slip rail (4x)

Park Type	Description	Level of Embellishment (The provided embellishment standards are to be used as a guide only)
	open spaces service the entire region and as such have the highest level of transport accessibility including active, public and private transport options. This includes providing spaces for buses, vehicle parking and cycling transport.	• Public toilet (2x) • Bikeway/pathway connections 2m wide (1000 LM) • Dog off-leash area (1x) • Seating (20x) • Bike rack (3x) • Tap/bubbler incl. meter + take off point (6x) • Topsoiling and turf (60,000m2) • Car park spaces (150x) • Access road (1x) • Electrical works incl. park lighting (1x) • Earthworks/drainage including suitable kick-a-bout area
Local Foreshore	Local Foreshore recreation parks are located in coastal areas and provide direct access to the bay and the open ocean for local communities. They are linear in nature and vary significantly throughout the region and include a range of park infrastructure items. In some coastal communities they provide the main recreation opportunities for the local area. These open spaces are developed to a basic standard and generally contain a limited range of park facilities.	There are no embellishment standards specified for foreshore parks but rather should be designed to meet the needs of the community it serves. The embellishment list for Local recreation parks may be used as a guide.
District Foreshore	District Foreshore Recreation open spaces provide informal passive and active recreation opportunities for all residents within the district catchment. They offer informal recreational experiences such as informal ball games, picnicking, BBQ, swimming, play, quite reflection and meeting friends. These parks provide a diverse range of facilities and spaces in a variety of settings to cater for large numbers of people during varying times of the year. District Foreshore parks need to be able to adapt to peak seasonal use such summer holidays. They provide an important focal point for social interaction and should enhance the landscape amenity and values of the area. Parks are developed to a high standard, connections to a cycle/path systems.	There are no embellishment standards specified for foreshore parks but rather should be designed to meet the needs of the community it serves. The embellishment list for district recreation parks may be used as a guide.
Regional Foreshore	Regional Foreshore Recreation open spaces provide social, cultural, leisure and recreational needs of all residents within the region. They are often an attractive tourist destination for people outside of the region and have to cater for high demands throughout the year. They offer informal recreational experiences such as informal ball games, picnicking, BBQ,	There are no embellishment standards specified for foreshore parks but rather should be designed to meet the needs of the community it serves. The embellishment list for regional recreation parks may be used as a guide.

Park Type	Description	Level of Embellishment (The provided embellishment standards are to be used as a guide only)
	swimming, play, quite reflection, interpretive art, festivals and meeting friends. These parks provide a diverse range of facilities and spaces in a variety of settings to cater for large numbers of people during varying times of the year. They provide a crucial focal point for social interaction. Regional recreation type open spaces service the entire region and as such have the highest level of transport accessibility including active, public and private transport options. This includes providing spaces for buses, vehicle parking and cycling transport. The park should be developed to a high standard.	
Bushland Recreation	Bushland recreation type open spaces preserve important bushland landscapes and provide unique nature based recreation opportunities for the community. They serve a dual purpose in providing informal recreation opportunities and experiences while safeguarding some of the region's natural assets. They may form part of the greater green infrastructure network by providing refuge for native animals, fauna and flora but can also provide recreational opportunities that are at a scale and intensity that contribute to the natural setting. This may include: • seating • shelters • BBQ's and picnic areas • connections to a cycle/path systems • providing opportunities for recreational trail users	There are no embellishment standards specified for bushland recreation parks but rather should provide facilities and activities that are considerate of the sites natural setting.
District Sport	District sport facilities provide enough space for a variety of playing areas such as courts, playing fields and surfaces. The facility serves several neighbourhoods or a small number of suburbs and is accessible to people by several transport modes. Vary between 10 - 30 Ha in size and cater for moderate volumes of demand and vehicle traffic. Typical infrastructure includes irrigated sports surfaces, hard courts, cycle tracks and jumps, indoor sports centres, athletics tracks and stations, fitness stations and walking tracks.	Level of provision should reflect current research into the minimum number of playing areas to provide for viable sporting clubs and competitions. A detailed master plan should be developed and approved by Council for all sport, recreation and open space facilities that are proposed as part of community infrastructure.

Park Type	Description	Level of Embellishment (The provided embellishment standards are to be used as a guide only)
	They are also to include necessary ancillary infrastructure such as competition and training lighting, clubhouses, public toilets, change rooms, storage rooms/areas, shade, spectator seating, drink fountains, litter bins, internal road network and parking facilities, signage, play equipment, informal kick-about areas and water harvesting for on-site re-use.	
Regional Sport	Regional sport facilities provide the highest standard of spaces and facilities for playing and practising formal, organised and competitive sporting activities. These are very large parks which can cater for high numbers of visitation and are used by both residents and visitors to the region. Are generally 30+ Ha in size and cater for large volumes of demand and vehicle traffic. Typical infrastructure includes irrigated sports surfaces, hard courts, cycle tracks and jumps, indoor sports centres, athletics tracks and stations, fitness stations and walking tracks. They are also to include necessary ancillary infrastructure such as competition and training lighting, clubhouses, public toilets, change rooms, storage rooms/areas, shade, spectator seating, drink fountains, litter bins, internal road network and parking facilities, signage, play equipment, informal kick-about areas and water harvesting for on-site re-use.	Level of provision should reflect current research into the minimum number of playing areas to provide for viable sporting clubs and competitions. A detailed master plan should be developed and approved by Council for all sport, recreation and open space facilities that are proposed as part of community infrastructure.
District Civic	District civic type spaces cater for the passive recreational needs of district commercial centres.	• Picnic tables (2x) • Public toilet (1x) • Hard pavement (400 m2) • Seating (including installation) (10x) • Feature infrastructure (1x) • Tap/bubbler incl. meter (+ take off point) (1x) • Bin (including installation) (2x) • Park signage • Landscaping (100m2) • Feature trees • Topsoiling and turf (100m2) • Park lighting • Bollards at 1.5m around the perimeter • Earthworks/drainage
Regional Civic	Regional civic type spaces are located in major centres and cater for large gatherings such as markets and performances.	• Playground (high quality interactive) • Softfall (400m2) • Picnic tables (2x) • Earthworks/drainage • Tap/bubbler incl. meter (+ take off point) (1x) • Bin (including installation) (2x)

Park Type	Description	Level of Embellishment (The provided embellishment standards are to be used as a guide only)
		• Public toilet (1x) • Hard pavement (400 m2) • Seating (including installation) (10x) • Feature infrastructure (1x) • Park lighting • Bollards at 1.5m around the perimeter • Park signage • Landscaping (100m2) • Feature trees • Topsoiling and turf (100m2)
Urban Linear Linkage	Urban Linear Linkage type open spaces provide a vegetated pedestrian link in an urban context which promotes connectivity to the broader open space network and destinations with connections to the on and off road pathway system. The size and shape may vary but is to adequately facilitate pedestrian and cycling movement in a pleasant environment that provides visual relief from urban development.	• Bikeway/pathway connections 2m wide (200 LM) • Seating - including installation(4x) • Picnic setting (1x) • Tap/bubbler incl. meter + take off point (1x) • Bin (including installation) (3x) • Park signage (2x) • Landscaping (900 m2) • Shade trees - 45L(40x) • Bollards at 1.5m centres • Slip rail (2x)
Natural Linear Linkage	Natural Linear Linkage type open spaces are typically designed to facilitate the movement of people to key destinations in a natural environment. These parks complement the natural landscape and are typically located along waterways, high ridgelines and conservation corridors. They provide informal recreation opportunities such as cycling, walking, group exercise and a place for relaxation and quiet contemplation.	• Bikeway/pathway connections 2m wide (200 LM) • Seating - including installation(4x) • Picnic setting (1x) • Tap/bubbler incl. meter + take off point (1x) • Bin (including installation) (3x) • Park signage (2x) • Landscaping (900 m2) • Shade trees - 45L(40x) • Bollards at 1.5m centres • Slip rail (2x)

Integrated Design - Appendix C
Stormwater Management

For State Approval - Major Amendment 1 - December 2017

Table of Contents

1.1 Introduction

The waterways and coastal areas of the Moreton Bay Region are central to the values and lifestyles of its residents and visitors. These natural assets are vital to the ecological, social and economic wellbeing of the community.

Across the region, waterway health has been in decline in both urban and rural areas; demands on water have increased, the landform is becoming more urbanized, pollutant loads are rising and flow regimes are becoming more variable. The impacts of flooding and climate change are also important considerations when planning for future communities.

Council recognizes the importance of taking an integrated approach to managing land development, waterway health, floodplains and coastal areas. This includes the protection of natural ecosystems, meeting the community's expectations for flood protection and delivering liveable communities.

A strong vision is required for the planning, development and management of all water resources across the Moreton Bay Region. The Moreton Bay Regional Council Water Strategy 2012-2031 has been developed to safeguard water security and increase waterway health and resilience. Council is committed to the Moreton Bay Region becoming a showcase of a Water Sensitive City.

WATER SENSITIVE CITIES ARE RESILIENT, LIVEABLE, PRODUCTIVE AND SUSTAINABLE. THEY INTERACT WITH THE URBAN HYDROLOGICAL CYCLE IN WAYS THAT: PROVIDE THE WATER SECURITY ESSENTIAL FOR ECONOMIC PROSPERITY; ENHANCE AND PROTECT THE HEALTH OF WATERCOURSES AND WETLANDS; MITIGATE FLOOD RISK AND DAMAGE; AND CREATE PUBLIC SPACES THAT HARVEST, CLEAN AND RECYCLE WATER.

CRC FOR WATER SENSITIVE CITIES

A water sensitive city is one that is resilient to low water availability and the impacts of climate change. It is a city that utilises many different water sources. It manages its water to meet the needs of the environment and the community and improves the health of our waterways.

1.2 General

Moreton Bay Regional Council is committed to managing stormwater based on best practice principles that ensure integrated solutions with the associated place types. These design standards have been prepared to guide new development and are to be read in conjunction with the MBRC Planning Scheme.

Key design principles that must be considered include:

a) Integrated and fit for purpose
b) Manageable and financially sustainable
c) Adaptable to growth
d) Safe
e) Promote diversity and community values
f) Improve water security
g) Improve waterway health
h) Protect coastal areas

The Queensland Urban Drainage Manual (QUDM) has been adopted as the basis of drainage design by the Moreton Bay Regional Council subject to any variation contained in this document.

All proposed designs are to be certified by a qualified *Registered Professional Engineer Queensland* (RPEQ) to ensure the design is fit-for-purpose, safe, minimises lifecycle costs including ongoing maintenance, and is constructed to a high standard. An RPEQ must inspect the works during construction to ensure that the design intent is achieved and certify the same prior to Council's acceptance of works "on maintenance".

The other aspects of stormwater design will be based on a range of guiding documents as listed in Section 1.5 of this appendix. Council is a partner of the Healthy Waterways and Catchments and supports their Water By Design documentation which is recognised as current best practice.

It is expected that a wide range of disciplines will be involved in an integrated stormwater design and the team may include (but may not be limited to) town planners, urban designers, architects, landscape designers/architects, civil engineers, ecologists, soil scientists, developers, constructors, operators and Certified Practitioner in Erosion and Sediment Control (CPESC).

1.3 Designer opportunities and obligations

The stormwater management system must minimise the impact of urban development and serve four key purposes:

a) Conveyance of storm surface run-off with minimal flood damage;
b) Protection of (or minimise impact to) water quality;
c) Protection of biodiversity and ecological function;
d) Groundwater management and protection

Designers are to consider all four aspects in the engineering design and endeavour to achieve them with minimal adverse effects on the environment. Potential adverse effects include flood damage, surface and channel erosion, sedimentation, water pollution, loss of biodiversity and damage to all aquatic ecosystems.

Designers must consider the following to provide holistic integrated design outcomes:

a) Safety during construction, operation and maintenance
b) Integration with the urban form
c) Integration with other Council objectives e.g. public open space and roads
d) Cost minimisation
e) Maintenance requirements
f) Reuse potential for stormwater (TWCM objectives)
g) Landscape/amenity
h) Ecological/habitat
i) Social values
j) Legislation
k) Industry best practice

The extent to which design flexibility can be exercised in practice varies with the type of development and/or stormwater design element being considered. Opportunities exist for the designer to apply an innovative and cost-effective approach to stormwater design, without the “strait-jacket” of older prescriptive standards.

While the approach to using only the “specific design criteria” provided may be valid for minor, straight forward developments, it is hoped that it will NOT be the general means of applying the standards.

A thorough understanding of the intent and performance criteria and satisfaction of these criteria by application of a design solution appropriate to the specific circumstances is preferred. This places the obligation on the designer to exercise good professional judgement at all times, and the responsibility to justify their decision.

The standards listed in the document are therefore expected to provide an acceptable outcome, however innovative solutions that meet the design principles and integrate water into the landscape to enhance a range of values will be considered by council.

It is strongly recommended that consultants have initial discussions with Council staff to agree on design concepts, particularly in the case of major or unusual projects.

Consultants are expected to have systems in place to assure the quality of the design drawings and reports that they produce. Detailed checking of engineering designs by Council Officers does not take the place of the consultants’ quality assurance and professional responsibilities.

1.3.1 Documentation

Designers must provide suitable documentation that allows Council to review the background, methodology, thought process and expected outcomes of the proposed stormwater management

system. The level of detail will vary based on the type of application however *Planning Scheme Policy - Stormwater Management* describes the format of a Stormwater Management Plan that must be included in development applications.

The documentation needs to detail the expected performance of the infrastructure, the correct operation and the maintenance requirements to ensure continued performance. An estimate of maintenance requirements including lifecycle costs is required to be included.

1.4 Legislative Requirements

1.4.1 Environmental Protection (Water) Policy 2009

The Environmental Protection (Water) Policy 2009 (EPP Water) seeks to protect Queensland waters while allowing for development that is ecologically sustainable and achieve the objectives of the Environmental Protection Act.

It achieves this by:

a) identifying environmental values for aquatic ecosystems and for human uses (e.g. water for drinking, farm supply, agriculture, industry and recreational use)
b) determining water quality guidelines, water quality objectives and management goals to enhance or protect the environmental values
c) providing a framework for making consistent, equitable and informed decisions about Queensland waters
d) monitoring and reporting on the condition of Queensland waters.

EPP Water Schedule 1 includes water quality objectives for various waterways within Queensland. The three relevant to Moreton Bay Regional Council include:

a) Pumicestone Passage including Elimbah Creek and Ningi Creek
b) Caboolture River and associated tributaries
c) Pine Rivers and Redcliffe Creeks including, Hays Inlet and all tributaries of the North and South Pine Rivers

These documents must be referenced to obtain water quality objectives for the listed waterways.

1.4.2 State Planning Policy

The Queensland Government State Planning Policy (SPP) covers all interest of the state, including water quality and stormwater management. The policy provides a comprehensive set of principles which underpin Queensland's planning system to guide local government and the state government in land use planning and development assessment. The SPP sets out the State interests that must be addressed through local government planning schemes.

State planning policy includes stormwater relevant requirements under three State Interests:

a) Environment and Heritage - Water Quality
b) Environment and Heritage – Coastal Environment
c) Hazards and Safety – Natural Hazards

1.4.2.1 Water quality State Interest

The Water Quality interest looks to protect healthy lakes, streams, wetlands, groundwaters, coastal waters and catchments. The policy promotes WSUD as an important approach to the planning and design of urban environments. The SPP objectives support the protection of environmental values identified in the Environmental Protection (Water) Policy 2009.

The SPP requires development to achieve the state interest by:

a) Protecting environmental values and the achievement of water quality objectives;
b) Achieving the applicable stormwater management design objectives as outlined in Tables A and B (Appendix 2); or demonstrate current best practice environmental management for development that is for an urban purpose;
c) Providing innovative and locally appropriate solutions for urban stormwater management that achieve the relevant urban stormwater management design objectives;

d) Avoiding or minimising the disturbance of land for urban or future urban purposes in areas with natural drainage, acid sulphate soils, erosion risk, groundwater and landscape features;
e) Protecting the natural and built environment (including infrastructure) and human health from the potential adverse impacts of acid sulphate soils;
f) Locating, designing and constructing/managing development for an urban purpose to avoid or minimise:
    i) Impacts arising from:
        A) Altered stormwater quality or flow rate, and
        B) Wastewater (other than contaminated stormwater and sewage), and
        C) The creation or expansion of non-tidal artificial waterways, such as urban lakes, and
    ii) The release and mobilisation of nutrients that increase the risk of algal blooms
g) Ensuring development in water catchments is undertaken in a manner which contributes to the maintenance and enhancement (where possible) of water quality to protect the drinking water and aquatic ecosystem environmental values in those catchments;
h) Ensuring development within a water supply buffer area complies with the specific outcomes and measures contained within the Seqwater Development Guidelines: Development Guidelines for Water Quality Management in Drinking Water Catchments 2012 or similar development assessment requirements.

The SPP provides additional detail for each policy element and includes a discussion on the issues and requirements for a strategic framework, development assessment, zoning and overlays.

The guideline states that the Urban Stormwater Quality Planning Guideline (EHP 2010) provides best practice information for the management of development and construction activities in accordance with the SPP design objectives.

1.4.2.2 Coastal Environment State Interest

This state has an interest in the coastal environment, including off-shore islands, as they are important for their natural processes and resources, and economic, social and aesthetic values. The policy seeks to protect and enhance the coastal environment while supporting opportunities for coastal-dependent development, compatible urban form, and safe public access along the coast.

The policy applies to all local government areas partially or wholly located within the coastal zone.

The SPP requires development to meet the state interest by:

a) Protecting coastal processes and coastal resources, and
b) Maintaining or enhancing the scenic amenity of important natural coastal landscapes, views and vistas, and
c) Consolidating coastal settlements by:
    i) Concentrating future development in existing urban areas through infill and redevelopment, and
    ii) Conserving the natural state of coastal areas outside existing urban areas, and
d) Focusing coastal-dependent development in areas adjoining the foreshore in preference to other types of development, where there is competition for available land on the coast, and
e) Maintaining or enhancing opportunities for public access and use of the foreshore in a way that protects public safety and coastal resources, and
f) Including the SPP code: Ship-sourced pollutants reception facilities in marinas (Appendix 1) or similar development assessment requirements.

1.4.2.3 Natural Hazard Management

A natural hazard is a naturally occurring event that may cause harm to people and our social wellbeing, damage to property and/or infrastructure and impact our economy and the environment. The natural

hazards that can be prepared for through land use planning and development decisions are flood, bushfire, landslide, storm tide inundation and coastal erosion.

The state has the interest to avoid or mitigate risks associated with natural hazards to protect people and property and enhance the community's resilience to natural hazards.

The SPP requires development to achieve the state interest by:

For all natural hazards:

a) Avoiding natural hazard areas or mitigate the risks of the natural hazard, and
b) Supporting, and not unduly burden, disaster management response or recovery capacity and capabilities, and
c) Directly, indirectly and cumulatively avoid an increase in the severity of the natural hazard and the potential for damage on the site or to other properties, and
d) Maintaining or enhancing natural processes and the protective function of landforms and vegetation that can mitigate risks associated with the natural hazard, and
e) Facilitating the location and design of community infrastructure to maintain the required level of functionality during and immediately after a natural hazard event.

For coastal hazards—erosion prone areas:

a) Maintaining erosion prone areas within a coastal management district as development-free buffer zones unless:
    i) The development cannot be feasibly located elsewhere, and
    ii) It is coastal-dependent development, or is temporary, readily relocatable or able to be abandoned development, and
b) Redeveloping existing permanent buildings or structures in an erosion prone area to, in order of priority:
    i) Avoid coastal erosion risks, or
    ii) Manage coastal erosion risks through a strategy of planned retreat, or
    iii) Mitigate coastal erosion risks.

1.5 Other Council documents

1.5.1 Strategic Framework

The Moreton Bay Region Strategic Framework is the vision and strategy component of the MBRC planning scheme to accommodate growth and development to 2031. The framework has been developed using key values identified by residents through the Community Plan.

The Moreton Bay Regional Council Strategic Framework:

a) Sets policy position for the Moreton Bay Region
b) Identifies future development intent for places throughout the Moreton Bay Region
c) Implements the Queensland Government's South East Queensland Regional Plan 2009-2031
d) Is used in the assessment of impact assessable development
e) Is used where a development does not comply with an applicable code

A key component of the plan is the definition of place types; the different locations where we work, live and play. Each place type includes a combination of elements including location, liveability, local population and employment targets in addition to infrastructure and environmental values. They create a blueprint for the categories of growth and planning that is expected in different neighbourhoods, communities and precincts.

1.5.2 Moreton Bay Regional Council Planning scheme

Council has a range of development codes that accompany the planning scheme and provide a range of requirements that must be met. The codes are contained within the MBRC Planning Scheme and they provide provisions for earthworks, waterways, stormwater, erosion prone areas. Separate codes have been developed for the Precincts of North Lakes.

These codes must be referenced when applying this policy.

1.5.3 Moreton Bay Regional Council Water strategy

The Water Strategy 2012-2031 has been developed to safeguard water security and increase waterway health. It provides guidance for the Moreton Bay Region to transition to a region with Water Sensitive Cities.

The Water Strategy has been created using key values identified by residents of the Moreton Bay Region in the Community Plan, including:

a) A healthy natural environment;
b) Quality recreation and cultural opportunities;
c) Increasing the resilience of communities

The Water Strategy establishes the vision, fundamental principles and strategic outcomes to guide Council's integrated water management into the future. The Strategy is endorsed as a primary policy and will assist Council in making informed decisions to become a region with water sensitive cities.

This strategy will also inform and lead the development of subsequent strategies and plans, including the Total Water Cycle Management Plan, Floodplain Risk Management Framework, and Shoreline Erosion Management Plans. These documents will outline the key actions and targets required to achieve a sustainable water future.

1.5.4 Total Water Cycle Management

Councils Total Water Cycle Management (TWCM) Plan presents the findings from the detailed planning phase in a TWCM planning process for the Moreton Bay Regional Council area. It has been developed in accordance with the TWCM Planning Guideline for South East Queensland in order to satisfy requirements of the Environmental Protection (Water) Policy 2009.

The studies have identified the key drivers for TWCM, existing and future water accounts, key catchment constraints, and key catchment issues. Solutions were developed and assessed using a multi-criteria analysis approach. An implementation plan has documented the identified catchment management solutions, strategies and actions to achieve TWCM outcomes. The strategies were developed in consultation with key stakeholders and included Unitywater, the Department of Environment and Heritage Protection, the Department of Agriculture Fisheries and Forestry, SEQWater, Pine Rivers Catchment Association and SEQ Catchments.

1.5.5 Open Space Strategy

The Moreton Bay Region has a diverse and complementary network of open space ranging from expansive national parks and state forests to recreational parkland, sporting fields and civic spaces.

Many of these spaces are managed by Council for the benefit of the public. The Open Space Strategy contains:

a) Council's vision and principles for open space provision;
b) Desired standards of service for public parks;
c) A future open space infrastructure list with identified land acquisitions and park upgrades; and
d) An action and delivery program to achieve Council's vision for open space.

Any multi-use of open space to incorporate stormwater management must also be consistent with Appendix B – Open and Civic Space Design.

1.5.6 Floodplain risk management framework

In 2010 Council commenced work on a floodplain management framework including new and updated floodplain modelling - the Regional Floodplain Database (RFD) project. In early 2013, Council released floodplain mapping to the community.

1.5.7 Green Infrastructure Strategy

The Green Infrastructure Strategy has the vision of a healthy and productive network of natural, semi-natural and engineered green spaces and assets valued for what they are, the ecosystem services they provide, and the contribution to regional biodiversity and environmental resilience.

1.5.8 Integrated Regional Infrastructure Strategy

The Integrated Regional Infrastructure Strategy (iRIS), will combine Council's infrastructure priorities with the priorities of other infrastructure providers in the region, such as water, sewerage and energy. iRIS will coordinate the planning, design and construction process for all infrastructure networks. This will assist Council in prioritising infrastructure projects based on a quadruple bottom line assessment that stimulates economic development, is socially equitable, environmentally robust and has a governance framework based on excellence and value for money.

1.5.9 Catchment Management Plans

Catchment Management Plans (CMPs) such as the Caboolture River Catchment Management Plan provide a review of all aspects of the water cycle. They review catchment opportunities and constraints, potential impacts of future development and mitigation measures. They develop solutions which seek to reduce the risk to people and property from flood and storm tide and enhance the environment to protect the lifestyles of residents and visitors.

These documents must be referenced where available as they list specific requirements that must be addressed to allow future development to occur.

1.6 Design Issues, Opportunities and Constraints

1.6.1 Introduction

The following section provides guidance on the relevant issues, opportunities and constraints that inform successful project delivery for the region.

1.6.2 Design Issues, Opportunities and Constraints

1.6.2.1 Water Sensitive Urban Design

Water Sensitive Urban Design (WSUD) is about integration of the urban water cycle into urban design to minimise environmental degradation and improve aesthetic and recreational appeal. The guiding principles of WSUD are centred on achieving integrated water cycle management solutions for new urban areas and infill developments. WSUD encourages stormwater elements to be at the forefront of the development and add to the aesthetics of the development rather than be hidden from view as a treatment or end of pipe solution.

Although WSUD principles are primarily concerned with improving waterway health outcomes for the region they also have many other benefits. The principles highlight that the traditional approach of collecting and conveying stormwater runoff within hydraulically efficient conduits in underground pipe networks is not the only means of stormwater management.

WSUD can include the application of several types of stormwater best management practices in series to achieve successful stormwater outcomes. WSUD techniques for stormwater conveyance do not usually conflict with traditional stormwater networks and can be integrated to ensure a holistic approach to the management of stormwater runoff to achieve multiple benefits. Stormwater treatment and reuse can both save potable water and assist in meeting water quality and flow management objectives in a development.

Water by Design have developed highly effective guidelines (Water Sensitive Urban Design Guidelines for South East Queensland) to assist interdisciplinary teams to conceptualise and develop design solutions that integrate best practice sustainable urban water management within the urban form. These guidelines plus others listed in Section 1.7.1 include design details for:

a) Bio-retention systems and devices
b) Constructed wetlands
c) Constructed waterways / Natural Channel Design
d) Swales
e) Gully baskets
f) Online Proprietary stormwater quality improvement devices
g) Stormwater harvesting
h) Sediment basins,

These guidelines and technical standards must be consulted and clearly understood when undertaking development in the region.

1.6.2.2 Urban Stormwater Quantity

The Queensland Urban Drainage Manual (QUDM) has been adopted as the basis of drainage design by Moreton Bay Regional Council subject to any variation contained in this document.

The Queensland Urban Drainage Manual (QUDM) has been prepared for the purpose of assisting engineers and stormwater designers in the planning and design of urban drainage systems.

The aim of QUDM is to provide details of technical and regulatory aspects to be considered during the planning, design and management of urban stormwater drainage systems, and to provide details of

appropriate design methods and computational procedures. Both hydrologic and hydraulic procedures are considered as well as environmental and legal aspects.

The prime objectives of QUDM are to address:

- the design of stormwater conveyance structures (not water quality) that exist from the down-slope allotment boundary to the edge of the defined watercourse
- the hydraulic design of structures that cross floodplains, such as constructed open drains and cross-drainage structures.

QUDM also provides guidance on the design of detention basins.

Australian Rainfall and Runoff must be referenced for larger flood studies involving estimation of hydrographs, runoff routing methods, rainfall analysis, flood frequency analysis etc.

1.6.2.3 Constructed Lakes

Historically, constructed water bodies have not performed well and suffered from a range of issues including weed ingress, sediment build-up, poor water quality, stratification, high turbidity, algal blooms, poor hydraulic performance and aesthetic issues resulting in a significant maintenance burden on Council. Any use of a constructed lake within a stormwater system will need strong justification and must be designed based on the Waterbody Management Guideline developed by Water By Design.

Constructed lake systems within urban developments are usually designed for amenity or recreational purposes. This contrasts with wetland systems, which are typically designed primarily for stormwater quality management. Constructed lakes have specific management needs as they hold open water which is sensitive to external pressures such as changes in land use, quality of water inflows, weed ingress, and loss of connectivity of adjacent water bodies.

The design of constructed lakes needs to consider their complex behaviour. In particular, the design needs to consider the alternate states that lakes can operate under depending on a number of influences and stressors. The designer must also be aware that constructed lakes are community assets and issues such as public safety, pest and weed control and integration into the overall landscape design must be considered at the planning stage, concept-detailed design and construction.

1.6.2.4 Erosion and Sediment Control

Suspended sediments have a major impact on the aquatic environment, altering habitats for aquatic organisms and reducing light penetration for plant growth. Water quality is also degraded due to the addition of pollutants such as nutrients, heavy metals and microbes, which can be attached to sediment particles.

Other stormwater pollutants can be attached to sediment particles, therefore large amounts of sediment result in additional pollutants in creeks and rivers. Sedimentation is arguably one of the most devastating impacts on waterways requiring immediate attention.

Consideration of erosion and sediment control measures is a key element of any stormwater management plan for all phases of a development. Refer to PSP Stormwater Management and International Erosion Control Associations, Best Practice Erosion and Sediment Control guidelines for further information.

Council is embarking on a proactive program to promote and improve the implementation, education and enforcement of best practice Erosion and Sediment Control on construction sites.

1.6.2.5 Waterway Corridors and Revegetation

Waterway corridor management refers to revegetation and the stabilization of watercourse banks to improve water quality by controlling sediment and erosion and capturing nutrients. Waterway corridor

management provides for specific environmental outcomes centred on habitat connectivity and integrity.

Developments adjoining waterway corridors must:

a) Maintain natural structures and functions that are essential to waterway health;
b) Maintain natural diversity;
c) Maintain natural stream flow characteristics to support the health of target species/communities;
d) Protect rare or threatened structures and functions;
e) Provide appropriate buffers and landscape integration between the artificial and natural elements.

The design and integration of the landscape immediately adjoining the Waterway corridor also requires careful attention if the transition is not to appear artificial or lacking in structure. This transition area must incorporate native plantings similar to those within the natural waterway corridor. A more structured planting design approach to this transition zone can provide higher amenity values.

Existing watercourse erosion and bank stability problems within or adjoining the subject land are required to be repaired and corrected with suitable best management practises, including revegetation.

A well vegetated creek line has many benefits such as:

a) Improving water quality
b) Increasing plant and animal diversity
c) Improving livestock condition
d) Stabilising banks
e) Controlling erosion
f) Providing habitat for native wildlife
g) Increasing property value

Natural riparian vegetation helps to stabilise banks, shade streams, reduce evaporation, provide food and habitat for wildlife, and most importantly, act as a buffer for water run-off within catchments. Revegetation can also offer potential flood risk benefit. When water flows through anchored vegetation, the increased roughness results in a lower flow velocity which decreases the probability of erosion. The flow resistance caused by any vegetation increase is dependent upon the overall maturity, thickness/stiffness, distribution and type.

The establishment of sustainable riparian vegetation is critical to the successful construction of waterways in urban developments.

It is important to plant species that are native to local waterways because they maintain biodiversity, provide suitable habitat and food for native wildlife.

1.6.2.6 Floodplain management

A major flood can be devastating for communities and industry, while a minor flood can be beneficial to the natural environment and agricultural industries. The planning and design of development within floodplains is highly complex and needs to consider both the needs of the community and the natural environment.

Development of land affected by flooding requires detailed assessment of the existing flood risk and catchment hydrology prior to design. If the development is located within a floodplain a detailed flood hazard assessment is required to identify the potential impacts of the development on the flood hazard and demonstrate that the flood plain management requirements have been satisfied.

The choice of hydrologic analysis must be appropriate to the type of catchment and the required degree of accuracy. When a full design hydrograph is required for flood mapping or to assess flood storage requirements, simplified hydrologic calculation methods such as the Rational Method are not acceptable.

1.6.2.7 Safety in Design

Public safety is an essential objective of stormwater system planning and design. Stormwater systems can include open channels, ponded treatment measures, and basins that can provide a significant safety risk where human interaction is likely to occur. Access to flooded areas and infrastructure must be discouraged during and after large rainfall events.

All stormwater management infrastructure is to be designed with reference to Safe Work Australia's Code of Practice for safe design of structures.

QUDM, Australian Rainfall and Runoff (including associated revision project reports) and the Water By Design / Healthy Waterways WSUD Technical Design Guidelines for SEQ include information on safety issues for stormwater infrastructure. QUDM includes a discussion on a risk management approach that must be adopted for activities that are expected to have a high risk. These documents must be referenced for further advice on safety.

The safety of the constructors, operators, maintenance personal and the general public must be considered during the design of stormwater infrastructure. Fencing or other means to prevent/manage unauthorised access may be required by Council.

1.7 Design Parameters

1.7.1 Technical Documents

Broadly, the technical documents to be used for stormwater management design are listed in the table below. The current editions of all documents are to be used unless specified otherwise.

Table 1: Technical Documents

Stormwater Management Element	Reference
Policy, planning, legal and technical requirements	• State Planning Policy (and associated guidelines) • Environmental Protection (Water) Policy 2009
Major and minor drainage design methodologies	• Queensland Urban Drainage Manual
Culvert and bridge hydraulics	• Austroads Waterway Design Guidelines • Queensland Urban Drainage Manual
Scour protection and drop structures design (chute blocks not permitted)	• Queensland Department of Main Roads – Urban Road Design Manual – Volume 2 • Queensland Urban Drainage Manual
Sediment and erosion controls, BMPs including sediment retention ponds	• International Erosion Control Association – Best Practice Erosion and Sediment Control
Water quality standards	• State Planning Policy (and associated guidelines), • Environmental Protection (Water) Policy 2009, • Queensland Water Quality Guidelines 2009
Best Management Practices for Water Quality / Total Water Cycle Management / Water Sensitive Cities	Healthy Waterways – Water by Design Guidelines including • Water Sensitive Urban Design Technical Design Guidelines for South East Queensland 2006 • Concept Design Guidelines for Water Sensitive Urban Design 2009 • Construction and Establishment Guidelines: Swales, Bioretention Systems and Wetlands 2010 • The Waterbody Management Guideline 2013 • Transferring Ownership of Vegetated Stormwater Assets 2012 • Draft Rectifying Vegetated Stormwater Assets 2012 • Maintaining Vegetated Stormwater Assets 2012 • Total Water Cycle Management Planning 2010 • Draft Stormwater Harvesting Guidelines 2009 • MUSIC modelling Guidelines 2010 • Framework for the Integration of Flood and Stormwater Management into Open Space 2011 • Stormwater Infrastructure Options to Achieve Multiple Water Cycle Outcomes 2009, Queensland Water Commission • Australian Run-off Quality—A guide to Water Sensitive Urban Design 2006, Engineers Australia
Runoff routing methods, hydraulic modelling, rainfall analysis, flood frequency analysis etc.	• Australian Rainfall and Runoff (and associated revision reports)
Data Management	• Data Capture Guideline 2010 • Asset Management Guideline 2010

Note: Where more than one of these documents covers the same issues, consultants must evaluate and justify the selected design.

Consultants design reports must clearly state the reference to the specific document (by title, section number and page number) that relates to each design procedure.

1.7.2 Lawful Point of Discharge

Stormwater runoff shall be conveyed to a point at which it may be lawfully discharged. The lawful point of discharge shall be determined using QUDM.

Approval in the form of an easement (size as described in Section 2.6.3) shall be obtained from downstream property owner/s of any property affected as a result of the discharge. A letter from the downstream property owner granting "discharge approval" as described in QUDM will not be accepted.

In staged developments, easement provisions shall be made in a logical sequence ensuring that the runoff from each individual stage is discharged at a lawful point of discharge. Easement provisions must be identified for downstream properties proposed for development in future stages during each stage of the development.

Discharge approval (as per QUDM) are not to be used.

1.7.3 Easements

Stormwater management infrastructure, other than inter-allotment drainage lines, must be located within roads, pathways, park or drainage reserves. Open drains shall not be located within private allotments in the General residential zone in all Precincts.

However, where site constraints restrict designs such that any Council and inter-allotment pipelines, overland flow paths and open drains must be located through private property, they shall be contained within easements.

Easements shall be connected to a point of lawful discharge.

Minimum easement widths for underground drainage are show in Table 2 below.

Table 2 Minimum Easement Widths – underground pipes

Pipe Diameter	Easement Width*
Stormwater pipe ≤ 825mm diameter	3.0 m
Stormwater pipe ≤ 825mm diameter and any other service	4.0 m
Stormwater pipe > 825mm diameter	Easement boundary to be 1m clear of the outside wall of the stormwater pipe (each side).
* A Moreton Bay Regional Council engineer may require additional easement width to be provided, in certain circumstances, in order to facilitate maintenance access to the stormwater system.	

All open channel works must be located within easement boundaries or on Council owned land. For the construction of large open channels, consideration must be given for easement access by Council maintenance vehicles and equipment. The minimum easement widths for open channels are shown in Table 3.

Table 3 Minimum Easement Widths – open channels

Channel Type	Easement Width*
Concrete lined	Channel width + 3m
Grassed lined	Channel width + 6m
Grassed swale batter slopes <1V:4H	Swale width + 3m
Catch drain/bank	3m minimum (completely contained within the easement)

Any water quality or WSUD elements be constructed in private property, an easement will be required that extends a minimum of 6m outside the extent of the infrastructure (includes the top of channels) of any element and include suitable access for maintenance equipment.

Where an outlet discharges into private property (including balance lots), an easement is to be provided for the greater of:

a) 20 metres; or
b) a sufficient distance to enable the discharge volume to return to sheet flow; and
c) must be of sufficient width to encompass the full flow width.

1.7.4 Minimum Stormwater Drainage Works

All drainage systems shall be designed in accordance with the major/minor drainage concept as discussed in QUDM.

The minor drainage system includes kerbs and channels, roadside channels, drainage swales, inlets, underground drainage, junction pits, access chambers and outlet structures designed to fully contain and convey the discharge from the minor storm.

The major drainage system is that part of the overall drainage system designed to convey the specified major storm flow. This system may comprise:

a) Open space floodway channels, road reserves, pavement expanses and other flow paths designed to carry flows in excess of the capacity of the minor drainage system;
b) Natural or constructed waterways, detention/retention basins and other major water bodies;
c) Major underground piped systems installed where overland flow is impractical, unacceptable, or incapable of carrying the required discharge.

The major storm flow is carried through the subdivision or development clear of allotments within required freeboard limits.

1.7.4.1 Major System

The major system for all place types shall be the Defined Flood Event.

The Defined Flood Event (DFE) is a flood scenario adopted by Moreton Bay Regional Council in order to establish certain development controls within the floodplain. The Defined Flood Event is similar to the 1% annual chance flood but with a further allowance for factors such as blockage, sea level rise and increased rainfall intensity. The further allowances include:

a) 1% AEP flood event using ARR design rainfalls
b) 1% Moreton Bay Design Storm (MDS) event which is a 15 minute in 270 minute embedded design storm (15min burst inside a 270 minute burst with storm 'wings' scaled down to preserve overall volume of an ARR design burst)
c) 1% MDS event with Moderate structure blockage – refer to report *Regional Floodplain Database - Floodplain Parameterisation* (SKM, 2012) report downloadable from the Council website.
d) 1% MDS event with 20% Increase in rainfall
e) 1% MDS event with 20% Increase in rainfall and increased downstream boundary (0.8m sea level rise for coastal models and 0.02% AEP event for inland models)
f) 1% MDS event with Medium Dense Vegetation changed to High Dense Vegetation and Low grass/grazing changed to Medium Dense Vegetation within the 1% AEP floodplain to reflect future revegetation.
g) 1% MDS event with Medium Dense Vegetation changed to High Dense Vegetation and Low grass/grazing changed to Medium Dense Vegetation within the 1% AEP floodplain and impact of increased residential development (Change in minor catchment fraction impervious) (this applies only to selected minor basins where urban development is a feature).

The major system design event may be increased in special circumstances as described in QUDM section 7.3.1.

1.7.4.2 Minor System

Kerb and channel is required on both sides of all roads except where swale drains or rain gardens are approved as part of an integrated stormwater management system. Kerb and channel is not expected in rural areas.

Catchpits are to be located to ensure that the flow in the channel does not exceed specified width and depth limits.

Field inlets are required at the lowest point of all commercial, industrial and multi-unit residential lots, and at lowest point of residential lots where the lot drains one or more upstream properties. Inter-allotment drainage is to be designed in accordance with QUDM and an easement is required over all downstream pipe work to the downstream legal point of discharge.

Full piped drainage is required from all catchpits and other inlets to the boundary of the subdivision, or approved point of discharge, unless otherwise permitted by these design standards or approved by a Moreton Bay Regional Council engineer.

1.7.5 Design Storm – Annual Exceedence Probabilities (AEP)

For design under the "major/minor" concept, the design AEPs to be used are given in Table 4. The drainage system is to be designed to cater for a fully developed upstream catchment.

Table 4: Minor System Design ARI and AEP

Development Category / MBRC Planning Scheme Zone/Precinct		AEP	ARI (to be deleted)
Centre zone		10%	10
Emerging community zone		Refer to relevant Zone/Precinct identified in the Structure Plan.	
General residential zone - Suburban precinct General residential - Coastal communities precinct Township zone (all precincts)		18%	5
General residential zone - Next generation precinct* General residential zone - Urban precinct*		10%	10
Industry zone (all precincts)		18%	5
Recreation and open space zone		63%	1
Rural zone Rural residential zone - lot sizes > 2 Ha		39%	2
Rural residential zone - lot sizes < 2 Ha		18%	5
Major road - longitudinal / cross drainage	Kerb and channel flow	10%	10
	Cross drainage	2%	50
Minor road - longitudinal / cross drainage	Kerb and channel flow	As per land use	
	Cross drainage	10%	10
Active Transport (Bikeways/Pathways)	Cross drainage	18%	5
Car parking	Kerb and channel flow	As per land use	
	Cross drainage	10%	10
Rear of allotment driveways (All zones)		18%	5

* Were a developments lawful point of discharge is constrained by existing development, Council may agree to an alternative design AEP.

1.7.6 Road definitions

QUDM adopts major / minor terminology for assessing the drainage requirements of roads. Table 5 below must be used to assign major/minor road categories for the Moreton Bay Regional Council functional road hierarchy for stormwater design purposes.

Table 5: Road Definitions

QUDM	Functional Road Hierarchy
Major road	Arterial, Sub-arterial, District Collector
Minor road	Local Collector, Access Street

1.7.7 Rational Method

The requirements of QUDM shall apply. Methods and equations identified in QUDM as 'preferred' or 'recommended' shall be adopted for minor drainage.

1.7.7.1 Design rainfall data

Design Intensity-Frequency-Duration (IFD) Rainfall shall be obtained from the Bureau of Meteorology website for the specific location of interest.

1.7.7.2 Coefficient of Runoff

The runoff coefficient (C values) shall be as defined in section 1.11.5 and QUDM.

1.7.7.3 Time of Concentration

The time of concentration calculations (including standard inlet times) shall be as defined in section 1.11.5 and QUDM.

1.7.8 Hydraulic Calculations

The requirements of QUDM apply.

The use of computer models is to be as described in Section 1.12.

Any additional calculations in support of overland flow path capacities, weir flows over kerbs, and flood fill studies are also to be submitted with the design for approval.

Drainage calculations and catchment plans shall be prepared in accordance with QUDM and presented to Council.

1.7.9 Mannings 'n'

Refer to QUDM for the applicable Manning's roughness coefficient.

1.7.10 Development levels and freeboard

An appropriate freeboard is to be added to the calculated Defined Flood Event (DFE) flood level. The freeboard allows for unmeasurable uncertainty in the hydrological and hydraulic calculations and modelling.

Freeboard is to be provided as specified in the Moreton Bay Regional Council Planning Scheme (refer to Part 8 - Overlays, 8.2.1 Coastal hazard overlay code and 8.2.2 Flood hazard overlay code).

1.7.11 Major Drainage System Design Criteria

The major and minor drainage system described in QUDM forms the basis of the drainage system within the urban area.

1.7.12 Cross drainage culverts

Road cross drainage structures (bridges, culverts and floodways) must be designed to satisfy the trafficability criteria as detailed in QUDM in the major storm event. Road cross drainage structures shall be designed with sufficient capacity to convey the minor storm event without the road being overtopped.

Trafficability will depend upon the combination of depth and velocity of flow over the road and shall meet the requirements as listed in QUDM.

The requirements may be increased subject to the assessment of the importance of the road, the significance of interruptions to traffic, and the economics of providing a higher level of serviceability.

All culverts must include provision for blockage as recommended by QUDM.

The likely effects of a storm event in excess of the major design storm must be considered and the consequences discussed with Council. This process requires the development of a 'Severe Storm Impact Statement' prepared in accordance with the requirements of QUDM. The 0.1% AEP is the desired severe storm to be considered.

All cross drainage culverts/structures are to be free draining.

1.7.13 Roof and allotment drainage

The requirements of QUDM shall apply.

1.7.14 Roadway flow width

The requirements of QUDM shall apply.

1.7.15 Master Plans

Where applicable, Council may provide a drainage master plan/catchment management plan that includes specific requirements for the local catchment.

1.7.16 Technical Drawings

Applicable standard drawings for stormwater infrastructure including Water Sensitive Urban Design are listed in Appendix H. These drawings will provide a base for construction details required to apply stormwater infrastructure within the region.

1.7.17 Stormwater Quality

Stormwater quality shall be managed to meet the requirements of the Environmental Protection (Water) Policy 2009 and the State Planning Policy.

The stormwater system is to meet the requirements of the SPP and TWCMP as listed in Section 1.4 and 1.5.

Development must also consider and adopt any recommendations from local studies or SBSMPs or CMPs for the receiving waters.

The development is to address water quality issues during operation and construction.

1.7.18 Integrated System

An integrated stormwater management system is to be designed around the three pillars of a Water Sensitive City:

a) Cities as water supply catchments
b) Cities providing ecosystem services
c) Cities comprising water sensitive communities.

The stormwater system must form part of an integrated system that will address water cycle management issues based on environmental, economic social and cultural considerations. The design of an integrated system is to:

a) provide the water security essential for economic prosperity through efficient use of diverse available resources;

b) enhance and protect the health of waterways and wetlands, the river basins that surround them, and the coast and bays;
c) mitigate flood risk and damage; and
d) create public spaces that collect, clean, and recycle water.

1.8 Application to zones

1.8.1 General

a) Lot layouts, street design and earthworks must accommodate the at-source/surface collection, transportation and treatment of stormwater.
b) Development must maximise the resource value of urban water systems by capturing all available opportunities to recycle and re-use water as it moves throughout the urban environment.
c) End of pipe stormwater treatment devices may be an appropriate solution where at-source and surface treatment is not practical provided there is suitable open space available for larger treatment devices.
d) The design of constructed waterways must mimic the natural stream forms in the immediate region.
e) The integration and location of larger treatment devices within the open space network must be guided by a number of general principles. These are:
    i) Do not impact on the primary function of the open space and maximise visual interest and amenity while adhering to guiding principles for optimal stormwater treatment.
    ii) Are located to avoid any risk of operational problems (e.g. scour, erosion) due to high velocity flows. As a minimum, flow velocities through constructed wetlands, bioretention systems and vegetated swales must not exceed 2m/s for events up to a 1% AEP (Refer to Water by Design technical guidelines). A high flow bypass is to be provided as a component in all designs.
    iii) High flow bypasses are to have a minimum grade of 0.5%.
    iv) Do not remove remnant vegetation to accommodate stormwater treatment.
    v) Look for opportunities to collect treated stormwater to re-use for irrigation or public water features.

1.8.2 Quantity Outcomes

a) Development must not result in water being diverted onto land that is not normally subject to overland flow.
b) All detention basins must be designed and constructed to appropriately manage stormwater discharge by limiting post development peak flows to the pre development flow rates.
c) Must convey a fully developed external catchment through the site.

1.8.3 Quality Outcomes

a) To improve bank stability and resilience of the Region's waterways, areas identified within Overland Map - Riparian Setbacks are rehabilitated/revegetated with native species in accordance with the minimum requirements outlined in 1.10.11.
b) Council's adopted TWCM Plan is implemented.
c) Development achieves the minimum stormwater management design objectives of the State Planning Policy as outlined in Schedule 10 of the MBRC Planning Scheme.
d) Development contributes to the achievement of the water quality objectives as outlined in Environmental Protection (Water) Policy 2009.

1.8.4 General Residential and Emerging Communities

1.8.4.1 General

The General Residential and Emerging Communities area comprises the majority of land holding in the region and therefore provides the greatest opportunity to reduce stormwater runoff and pollution. Topography is the most important influencing factor when planning for residential subdivisions. Topography defines water shed boundaries, the pre-existing pathways for water movement, and establishes ecological corridors that support regional biodiversity. Urban design that responds sympathetically to topography will generally deliver better environmental outcomes.

1.8.4.2 Specific Guidelines

a) Street lengths (typically 75 -100m) from high points to low points, longitudinal grades, and pavement cross-falls ensure stormwater is conveyed within the road carriageway to stormwater

treatment devices located at low points, so that stormwater is treated before entering the piped drainage network.

b) A minor and major drainage system that achieves desirable flow widths, depths, velocities and freeboards as described previously

c) Road side swales are only to be used where adequate separation between the swale and lot frontages can be achieved as per MBRC standard drawing MBRC-1105.

1.8.5 Industry and Centre

1.8.5.1 General

Industrial areas are developments that generally have large impervious areas and often discharge large volumes of stormwater containing a more variable range of pollutants than stormwater from residential or commercial areas. There are many challenges associated with industrial developments that need to be addressed on a site specific basis at the design stage of a subdivision. Some industrial buildings (such as bulk warehouses) often generate significant roof water runoff and have minimal on site demand for recycled water, provide stormwater harvesting opportunities for on-site landscaping, non-potable uses such as toilet flushing or other adjoining compatible land uses that demand higher recycled water such as sporting fields.

Centres are urban areas that are well connected by transport routes and contain buildings and infrastructure of high quality urban design. Centres accommodate larger building footprints, higher density and more compact development. In commercial buildings water use is dominated by toilet flushing and there is little demand for drinking water and garden irrigation. Roof water harvesting at the allotment scale, supplemented by a precinct-scale treated grey water or sewer mining source must be investigated.

1.8.5.2 Specific Guidelines

a) Planning and design of industry and centre developments co-locate land uses that generate recycled water with compatible land uses that demand recycled water.

b) Building design minimise stormwater runoff across contaminated work and storage areas.

c) Oil/Grit Separators are to be provided for car parks or hardstand areas of Industrial or relevant commercial development where other catchment based water quality treatment devices are not available.

d) Design of industrial and centre developments incorporate mechanisms to capture spill before entering the drainage system.

1.8.6 Environmental Management and Conservation, Recreation and Open Space

1.8.6.1 General

Natural areas are important ecological landscapes that are crucial to protecting the biodiversity within the region. Development adjoining these areas must take a whole of catchment approach during planning and design so that the environmental values are preserved and conserved in their natural state.

1.8.6.2 Specific Guidelines

1.8.6.2.1 Waterway corridors

a) Development does not adversely impact on the hydraulic performance of a flood channel.

b) Existing watercourses or drainage features are to be revegetated with native species.

c) An investigation into the stability of banks is required for any development within a waterway corridor to ensure that any development will not be subject to erosion or landslip. The investigation needs to cover site geology, stream hydraulics, creek morphology and the remediation of buffer works.

1.8.6.2.2 Floodplains

a) Flood modelling (including flood storage calculations) must demonstrate that any proposed works or structures within the floodplain do not result in any adverse changes to the flood storage capacity, flood levels or behaviour of the floodplain.
b) Building works or structures are not to result in the loss of functional flood plain.
c) Earthworks/fill within a flood plain does not to occur without the provision of compensatory flood plain storage (refer to Planning Scheme Policy - Flood hazard, coastal hazard and overland flow).
d) Site earthworks must not compromise the functional flood plain or conveyance of flow or adversely impact the hydraulic characteristics of the watercourse/floodplain.
e) Development shall provide for safe evacuation from the floodplain to an area of refuge above the Probable Maximum Flood.

1.9 Design Details – Water Quality

1.9.1 Introduction

Water Sensitive Urban Design infrastructure is to be designed in accordance with Moreton Bay Regional Council standard drawings unless otherwise approved in writing.

Any proprietary product to be used in Moreton Bay Regional Council must be submitted to Council for assessment of its suitability for a particular application. When Council is satisfied that a particular produced has conformed to all the technical specifications, performance and maintenance objectives, the proprietor or manufacturer will be advised in writing of its suitability of use. Notwithstanding this acceptance advice, Moreton Bay Regional Council reserves the right to withdraw the approval for use of any product at any time.

The following WSUD elements have proven to be effective and applicable for use. Alternative or innovative measures may also be appropriate based on catchment characteristics, performance, maintenance, costs and receiving environment.

a) Constructed wetlands
b) Bioretention systems
c) Swales
d) Gully baskets / gross pollutant traps
e) Online Stormwater Quality Improvement Devices (SQIDs)

In keeping with the recent trends in WSUD, these devices focus on treating run-off from local catchments 'at source', rather than offering 'end-of-pipe' solutions. They are designed to treat small, frequent stormwater flows prior to discharge to underground stormwater pipe networks, channels or natural waterways.

All devices are unobtrusive, maintainable, cost effective and proven by experience to be the most suitable for road and street projects within the Moreton Bay region.

All measures must be selected based on site constraints and opportunities and consider topography, cost, safety, maintenance requirements, multiple benefits, etc.

1.9.2 Key design criteria

Technical guidance on the selection and design of WSUD elements is to be obtained from the Healthy Waterways Water Sensitive Urban Design Technical Design Guidelines for South East Queensland and any associated updated technical documents developed by Healthy Waterways and Catchments (Water by Design).

1.9.3 Construction and Establishment

The construction and establishment of vegetated systems is critical to their performance. Design documentation must include a discussion on any specific requirements and potential risks to the infrastructure and water quality during these phases. The Water By Design Construction and Establishment Guidelines must be referenced.

1.9.4 Maintenance

The maintenance of poorly designed and executed vegetated assets can be timely and cost prohibitive. The design of these assets must consider suitable maintenance access to all key areas of the asset. Design documentation must include a discussion on any specific maintenance requirements and an inspection and maintenance checklist for each piece of infrastructure. The checklist must include inspection and maintenance frequency and required maintenance activities. The Water By Design's Maintaining Vegetated Stormwater Assets guideline must be referenced for all vegetated assets.

1.9.5 Natural Channel Design

Natural Channel Design is based on providing the required hydraulic conveyance of a drainage channel and floodway while maximising its potential environmental values. It is a holistic approach that combines the disciplines of hydraulic engineering, fluvial geomorphology and in-stream and riparian ecology.

The design of the channel considers the regional importance of the waterway, the local plan form of the watercourse, the channel cross-section, and finally the design of in-channel features.

Natural channel design is to undertaken in accordance with QUDM.

1.9.6 Stormwater Harvesting

The harvesting of stormwater allows the capture and reuse of stormwater for non-potable uses. This not only provides a valuable water resource, it also assists with the management of stormwater quality. Capturing and reusing stormwater reduces the volume of contaminated stormwater entering local waterways, reduces the frequency and the magnitude of frequent runoff events.

Stormwater harvesting is included for specific greenfield areas within the MBRC Total Water Cycle Management Plan. The Water By Design Stormwater Harvesting Guidelines are to be referenced for additional technical guidance. The adoption of any stormwater harvesting off take system must not impact adjacent flood levels.

1.10 Design Details - Drainage infrastructure

Stormwater drainage infrastructure is to be designed in accordance with Moreton Bay Regional Council Standard Drawings unless otherwise approved in writing by a Moreton Bay Regional Council Development Assessment Engineer.

Any proprietary product to be used in Moreton Bay Regional Council must be submitted to Council for assessment of its suitability for a particular application. When Council is satisfied that a particular produced has conformed to all the technical specifications, performance and maintenance objectives, the proprietor or manufacturer will be advised in writing of its suitability of use. Notwithstanding this acceptance advice, Moreton Bay Regional Council reserves the right to withdraw the approval for use of any product at any time.

1.10.1 Gully Inlets. Field Inlets and Manholes

The requirements of QUDM shall apply.

Provision for blockage as recommended by QUDM shall be adopted.

Access chamber cover locations in carriageways are to avoid bike lanes and wheel paths and are to comply with the table below:

Road width	Distance from Kerb
≤ 6.0m	At least 1.5m off invert of kerb
> **6.0m**	At least 2.0m of invert of kerb

Inlets capacities for standard gully inlets shall be based on Brisbane City Council hydraulic capture charts as provided on their webpage for technical documents.

The maximum diameter of stormwater pipes under the kerb is 600mm.

Stormwater pipe connections around road corners are not to extend behind the back of kerb more than 300mm.

Maximum gully pit to pit pipe connection is to be 600mm diameter. In locations constrained by services (e.g. gas corridor or street light footings) a gully pit to pit pipe connection is to be a maximum 450mm diameter.

Gully pit to manhole to gully pit connections are not acceptable unless the final gully pit is a sag pit prior to the outlet i.e. once the system enters a manhole it cannot return to gully pit only connections regardless of pipe size.

Gully pits shall be located on a section of straight, wherever possible, to reduce the likelihood of conflict with future driveway locations. Overland flow paths shall be provided at all sag points and directed to a lawful point of discharge.

Anti-ponding gullies in curves shall be side entry type, chamber and grate only.

1.10.2 Pipes/Box Culverts

General requirements:

a) Pipes used may be made from either reinforced concrete or fibre reinforced concrete type[1].
b) Minimum longitudinal pipe size – 375 mm diameter.

[1] Alternative products may be used subject to approval by Moreton Bay Regional Council Engineer.

c) Minimum gully pit connections – 300mm diameter.
d) Minimum cross drainage size – 450mm diameter.
e) Pipes up to and including 600mm diameter shall be rubber ring joined (regardless of location).
f) Pipes greater than 600mm diameter, where not located in sandy soils, shall be internal flush jointed with pipe manufactures proprietary external bands.
g) Minimum clear cover shall be 600mm in all instances, unless approval otherwise by a Moreton Bay Regional Council engineer.
h) Pipe class and bedding type to be determined based on the current Australian Standard 3725 - Design for installation of buried concrete pipes.
i) The minimum vertical and horizontal clearance between and stormwater pipe and any other pipe or service conduit shall be 300mm.

Pipe trenching is to be designed and constructed in accordance with I.P.W.E.A. standard drawings and subject to the following requirements:

a) In sandy subsoil areas the bed zone material is to be 20mm screenings.

Where backfill materials are located onsite then testing information is to be provided to Council's delegated officer to demonstrate the suitability of the material in accordance with PSP Operational Works, Inspection and Bonding Procedures prior to the works being undertaken onsite.

All pipelines located in sandy locations (Bribie Island, Beachmere etc.) are to be rubber ring jointed. Reinforced concrete box culverts are not permitted in these locations unless appropriate steps (as agreed by Council) are taken during construction to prevent the ingress of sand through the joints.

Sandbands are required when flush jointed pipes are used.

In locations where the drainage system will be subject to a salt water environment and/or aggressive groundwater conditions, Consultants must liaise with the relevant suppliers for an appropriate product designed to comply with the current Australian Standard and meet the specific site conditions. In particular, special consideration shall be given to material selection in areas affected by tidal waters at levels less than RL1.5mAHD. In these circumstances, sizing of the applicable pipe diameter must consider the internal diameter to cater for increased external thickness.

1.10.3 Kerb adaptors

Only approved full height kerb adaptors are permitted. The kerb adaptors must be placed in a location where the service pits on the footpath will not conflict with the future pipe location. A minimum of two (2) kerb adapters are to be provided per allotment that drains to the road in accordance with Council's standard drawing (refer to Appendix H). Where a lot has side crossfall of up to 1.5%, one (1) kerb adaptor shall be located at each side of the lot. Where a lot has side crossfall of greater than 1.5%, both kerb adaptors shall be located at the low side of the lot.

For lots with a concrete footpath at the frontage, the kerb adaptors shall be connected to the front boundary of the lot with Class SN8 uPVC stormwater pipe.

The opening in the kerb must be sawcut and kerb adaptors must be installed flush with the top of the kerb. Kerb adaptors must be fixed in accordance with the manufacturer's specification and all gaps must be filled with approved materials.

Any damage to Council kerb and channel as a result of installing a kerb adaptor is to be borne at the cost of the contractor.

Where roofwater is proposed to be piped directly in through the back wall of a gully then an inspection of the opening and finish shall be carried out by a Moreton Bay Regional Council inspector. Council may request alternative locations to be adopted based on structural defects.

1.10.4 Discharge to Tidal and Other Waterways

The requirements of QUDM apply except minimum tailwater.

Levels for discharge to Tidal Waterways shall be as follows:

Design Condition	Design Tailwater Level
Minor storm	0.8m AHD + 0.8m greenhouse effect
Major storm	1.2m AHD + 0.8m greenhouse effect

Note: In existing urban areas, alternative design tailwater conditions may be considered by Council.

1.10.5 Open channels

The requirements of QUDM shall apply, except for the following:

a) Afflux due to bridges, culverts and other structures shall be calculated using methods outlined in QUDM.
b) In the analysis of soft faced channels, two roughness coefficients must be used to represent the well maintained and vegetated (unmaintained) state to check velocity and freeboard requirements respectively.
c) All hydrologic and hydraulic calculations for the purpose of determining ultimate flood levels and development fill and flood levels shall be based on 1% AEP flows for a fully developed catchment and a fully vegetated waterway corridor using minimum Manning's n of 0.15, unless otherwise approved by Council's Flood Engineer.
d) A maximum velocity of 1.5m/s is to be maintained within grassed sections of any drain. Where drop structures are used within the grassed section of open drains to dissipate energy and ensure velocities do not exceed 2m/s, details of the proposed energy dissipation measures must be submitted to Council for approval.
e) Within open drains a low-flow drainage pipe is required which complies with the following criteria
    i) Nominal one half of the one Exceedance per Year (EY) design flow (1 year ARI capacity)
    ii) Minimum diameter 375mm
    iii) Surcharge manholes into the open channel
    iv) Maximum velocity within pipe as per QUDM
f) In lieu of low-flow drainage pipe, a formed concrete invert (vee or dished) must be used which meets the following criteria:
    i) Minimum width 2m
    ii) Maximum velocity 2m/s
    iii) Energy dissipation at drop structures
    iv) At least 1m wide strip of turf each side of invert
    v) Minimum longitudinal grade 1 in 200.
g) Open drains are to be vegetated with robust native grasses that form a mat of grass rather than growing in clumps.
h) Maximum side slopes 1 in 4. Batters between 1 in 4 and 1 in 6 are to be turfed.
i) Open drains within private property must follow the property boundaries. Where this cannot be achieved, open drains across the property are not permitted within the initial 40 metres of the allotment measured from the front road/street boundary. Under no circumstances can open drains straddle allotment boundaries.
j) Except where open drains follow a property boundary or as otherwise approved in writing, the applicant is required to construct a vehicle crossing to navigate the open drain. Calculations showing the impact on the drainage design are required.
k) A combined system using a low flow drainage pipe and concrete invert will be required where the minimum channel grade of 1 in 200 cannot be achieved in the overland flow path.

l) Overland flow paths must be located immediately opposite sag points.
m) All concrete aprons are to have cut-off walls a minimum of 600mm in depth.
n) Stormwater quality treatment devices may be required prior to overland stormwater flow entering a stream, creek, park, open space etc.
o) All systems are to be designed with approved erosion and sediment control measures.
p) Where pathways are designed as overland flow paths, they are to be provided with a concrete footpath of a minimum 1.5m width and the remainder of the pathway shaped and turfed to provide a suitable flow path. A review of the hazard must be undertaken to confirm that the safety criteria as described in AR&R and QUDM (i.e. flow depth and flow velocity) are acceptable
q) In coastal environments:
    i) the channel inverts must not penetrate any acid sulphate soil layers; and
    ii) the acid sulphate soils are at least 0.5m below the channel invert; or
    iii) the channel is concrete lined

The above requirements are not intended to exclude alternative designs which would result in water quality treatment benefits.

Where the minimum invert level of an open channel is below HAT, the channel must be concrete lined to prevent increasing tidal zone and to prevent establishment of mangroves

1.10.6 Safety
Depth-velocity product indicates the safety of overland and channel flow. The requirements of QUDM shall apply.

1.10.7 Rear of allotment drainage
Refer to QUDM (Level III) for design details of a rear of allotment drainage system.

1.10.8 Conveyance of Flows from External Catchments
Overland flow, whether in concentrated or broad sheet flow form, is not to cause an increase in flow on upstream or downstream properties, does not result in any other area to be wet, does not concentrate flow, and ensures a legal point of discharge

The following are a list of possible solutions:

a) Diversion drains
b) Bunding
c) Field inlets and pipe systems
d) Property fencing (*property fencing may form part of the wetted perimeter of an overland flow path only if it is designed by a structural engineer and is of a permanent nature and constructed of masonry brick or similar materials to a height of 600mm above ground level in the flow path. The maximum height of the calculated water surface elevation above the ground level shall be no more than 300mm. Consideration must be given to reducing the permeability of fencing to avoid adjacent property damage. Any fencing used to contain overland flow is to be constructed as part of the development works*).
e) Swale drains

1.10.9 Waterway Corridors
Where development adjoins a waterway corridor and revegetation is required for bank stabilisation, to maintain/improve stream integrity, to restore areas disturbed by construction or as otherwise required by a site based stormwater management plan, riparian corridors are to be revegetated a minimum of 1.5 times the bank height or 7 meters (whichever is the greater).

Species are to be selected from the appropriate Regional Ecosystem list for the site and planted at a density consistent with that Regional Ecosystem. Plant stock is to be sourced from the local provenance in the first instance.

Unless otherwise approved by Council, plants are to be randomly spaced (not in rows). Unless otherwise specified for the Regional Ecosystem, the following minimum densities are to be used:

a) Groundcover – 2 per 1m2
b) Shrubs – 1 per 1m2
c) Low tree – 1 per 3m2
d) Canopy tree – 1 per 5m2

In areas where steep banks or erosion is likely, jutemat and increased planting densities will be required.

1.10.10 Fauna Crossings

Fauna passage is required to be considered in the design of stormwater management infrastructure.

Refer to QUDM (Section 11.2.5) for guidance on when and how fauna crossings are to be applied within a stormwater management system.

1.11 Design Details - Stormwater detention

Urban development has the potential to increase both stormwater runoff volumes and peak discharge rates. Stormwater detention and retention can limit flooding impacts however it is preferred to adopt water sensitive development to minimise changes to the hydrologic regime.

'Basins provided for quality treatment only or detention and quality treatment are to be treated as dry detention basins for design purposes as described in the following sections.

The design and location of basins will influence if they have a negative or a positive impact to stormwater flows and great care must be taken in their design and integration with the surrounding catchments. Poorly located and designed basins may cause flows from different tributaries to peak at the same time, increasing peak flow rates for downstream locations. Assessing the performance of a basin may include modelling to a key/sensitive downstream location or junction.

QUDM must be referenced for the design of any detention/retention system. The potential problems associated with detention/retention systems as outlined in QUDM must be considered by the designer.

Legal point of discharge is required for all detention basins.

1.11.1 Detention basin application and function

Detention basins are typically designed to provide temporary storage for increased surface runoff. Stored water is subsequently released at a controlled rate. The outlet is typically located on the bottom of the basin which is designed to restrict the outflow. Dry basins are designed to empty completely between storms and are therefore dry except during storm events

1.11.2 Location of Basins

Detention basis are to be located in natural depressions, where available, requiring minimal disturbance to existing vegetation and minimal excavation.

On flat sites or where extensive works are required, basins shall be designed so that they appear to be natural land form. This will generally require a curved or serpentine form with side slopes having variable gradient to provide contour relief.

Landform, geology and soils at the proposed site must be suitable for the development of the basin. If significant quantities of sediment are estimated to enter the storage area, there must be scope for periodic de-silting (including maintenance access). Areas showing evidence of land instability or with a high water table must be avoided.

The basin shall ultimately be located in a drainage reserve unless otherwise approved by Council. The drainage reserve must be located adjacent to recreational parks to facilitate maintenance. Where possible, the basin is to be integrated into the design of open space and form part of the overall landscape plan for the development without distracting from the functionality of the open space.

QUDM shall be used to provide guidance on the general placement of detention systems within a catchment.

1.11.3 Design Objective

The design requirements of QUDM apply.

In general, (unless modelling indicates that a basin will cause a negative impact), a detention facility shall be provided to control the discharge of stormwater from a development area so as to restrict the post- development flows to pre-development flows, for all storm events up to and including the 1% AEP event.

Any discharge onto downstream properties must not result in an increase of concentration of the stormwater.

The objective of stormwater management is to ensure no worsening of the site discharge conditions. Where a site discharges to a floodway in a much larger external catchment, the objective will remain as non-worsening of the site run-off, rather than non-worsening of the major floodway flow, unless otherwise accepted by Council.

1.11.4 General Constraints

For dry detention basins, no part of the basin including the embankment or retaining wall is to be closer than 3m from any adjoining property boundary or road reserve.

For wet detention basins, no part of the basin, including the embankment and/or retaining wall, is to be closer than 10m from any adjoining property boundary or road reserve.

A maximum 1:4 crossfall and longitudinal slope is required for the perimeter of all basins.

Grassed embankment slopes are to be 1 in 6 or flatter. Landscaped batters or structural elements at steeper slopes will be subject to Council approval.

The design and layout of detention basins in open and civic spaces must consider the useability of the space, integrating into the surrounding landscape and all ability access.

Floor slopes to accord with QUDM unless otherwise accepted by Council and be self-draining at a minimum grade of 1 in 100.

Ongoing maintenance is to be considered in the design of the basin including the provision for maintenance access to inlets, outlets and basin base.

Basins with retaining walls exceeding 600mm in height are not to be provided.

Upstream properties are not to be impacted by the basin outlets become fully blocked.

1.11.5 Flow Calculations and Volume Determinations

Simplified hydrologic methods such as the rational method must not be used whenever a full design hydrograph is required to assess flood storage issues.

Unless otherwise directed a method that generates a hydrograph must be adopted for the design of those components of the drainage system which are volume dependant, such as detention basin.

Flow calculations associated with sizing and designing a detention basin must be undertaken in accordance with the relevant chapter of QUDM.

Specifically the design of the basin and its outlet structures must be based on a range of storm durations and appropriate temporal patterns in order to identify the critical hydraulic dimensions. If the basin is required to prevent an increase in flooding at a given location, then the performance of the basin needs to be checked for a storm duration equal to the critical storm duration at this location. If the basin is required to prevent an increase in flooding at all locations downstream to the basin, then the performance of the basin needs to be checked for a range of storm durations up to the critical storm duration of the most downstream location.

It is Councils preference that all detention basins designed using a hydrologic method as stated above are tested and validated using an industry standard hydraulic model.

Where an existing floodway storage and/or existing attenuation volume (e.g. farm dam) is to be used to provide attenuation, the existing storage volume cannot be considered in the attenuation calculation.

The basin design inlet shall provide the developments detention volume, as derived above, over and above the existing storage volume i.e. the existing storage must be modelled as full prior to the storm event.

Where the proposed development will alter the time to peak of external runoff through the site (for example by piping the external runoff or reducing the volume of floodway storage traversed by that runoff) is to;

a) Include both the external catchment and the development area in the calculations.
b) Calculations for the post development case shall allow for the increased impervious area of the development area and a reduction of the overall catchment time of concentration.

Where the proposed development will not alter the time to peak of external runoff through the site, the attenuation requirement and the consequent detention volume for the development is to:

a) Based on just the subject development area's increase in impervious area and changed time of concentration
b) Consider flow attenuation facilities within the catchment (e.g. farm dam) and the calibration of the pre-development scenario with their exclusion
c) Calibrate a storage routing model using the Rational Method calculation for post development flows
d) Provide detention volume over and above any existing floodway storage.

Where the proposed detention basin is to be located in an existing floodway, the basin's outlet works must be designed to ensure that the required detention volumes are achieved (for all storm events), over and above the existing floodway volumes.

Council may require the application of a hydraulic routing model (XP-SWMM, MIKE11 or similar) to both the pre developed and post developed scenarios to verify non-worsening, particularly in cases where the basin is proposed to be formed by alteration of an existing floodway.

1.11.5.1 Rational Method Calculation of Peak Flows

In the calculation of pre development flows, overland sheet flow time must be calculated by Friend's equation as described in QUDM. In calculation of post development flows, QUDM standard inlet times must be adopted or sheet flow times must be calculated by Friend's equation and combined with segmental travel times, whichever is more appropriate to the particular circumstances.

Rainfall intensity tabulation must be used. Rainfall intensities are to be calculated using methods provided in AR&R. The adopted method, supporting tables/ calculations and relevant co-ordinates are to be provided.

Coefficient of Discharge must be calculated using QUDM.

Fraction impervious for each zone and/or precinct as per the table below:

Development Category / MBRC Planning Scheme Zone/Precinct	Fraction Impervious	
Centre zone - All precincts	90	
Community facilities zone - all precincts	50	
Emerging community zone	Refer to relevant zone/precinct identified in the Structure plan	
Environmental management and conservation zone	0	
Extractive industry zone	25	
General residential zone - Coastal communities precinct General residential zone - Suburban neighbourhood precinct	50	
General residential zone - Next generation neighbourhood precinct	With road layout	85
	Without road layout	80
General residential zone - Urban neighbourhood precinct	90	
Mixed industry and business zone - All precincts	With road layout	90
	Without road layout	85
Rural zone - All precinct	0	
Recreation and open space zone Recreation and open space zone - Sport and recreation precinct	0 15	
Rural residential zone - lot sizes > 2Ha Rural residential zone - lot sizes > 6000m2 Rural residential zone - lot sizes < 6000m2	10 15 20	
Township zone - Centre precinct Township zone - Convenience precinct Township zone - industry precinct	90	
Township zone - Residential precinct	50	
Road reserves - where not otherwise specified	70; or Fraction of width paved	

1.11.6 Existing Site Storage

The impacts of the proposed development on the existing storage of floodways which convey the flow through the site must be considered. The development must not result in a net loss of flood storage. Where a basin is proposed to be located in a natural floodway, the required detention volume shall be provided over and above the natural floodway volume.

1.11.7 Flow spread from basin outlet to downstream property

Any discharge onto downstream properties must not result in an increase of concentration of the stormwater onto that property.

Hydraulic calculations must be undertaken to determine the pre developed width of flow at the downstream property boundary is not increased following the development. The outlet of the basin will need to be located far enough from the property boundary to ensure that the pre developed flow width, depth and velocity at the boundary is achieved.

1.11.8 Public Safety

For dry detention basins the depth of water shall be restricted to 1.2m at the 5% AEP.

For wet detention basins, public safety and access must be considered in the design.

1.11.9 Embankment Protection / Freeboard

A minimum of 0.3m freeboard must be provided above the 1% AEP storage depth to protect the embankment crest and includes considerations of a fully developed upstream catchment.

1.11.10 Commercial and Industrial Development – On-site detention

Commercial and industrial development shall install on-site detention (OSD) unless alternative treatments are approved by a Moreton Bay Regional Council engineer.

Site specific design or proprietary systems may be used provided they incorporate high early discharge devices. The minimum discharge outlet diameter is 100mm. A 10% AEP storm event is required to be partially captured and temporarily stored underground. For 1% AEP storm events, suitable sized overland flow paths with lawful points of discharge shall be designed to allow for the full 1% AEP peak discharge. A check must be made that blockage of inlets does not result in above floor flooding. All OSD systems are to include a water quality treatment system e.g. oil/grit separators and/or sediment trap. The minimum requirement is that this system shall capture and treat the first 150m^3/ha of development runoff.

1.11.11 Retention systems

QUDM states that stormwater retention systems can be designed to reduce the 'total annual runoff volume', and/or reduce the runoff volume from a specified design storm. Reducing the total annual runoff volume provides water quality benefits by reducing pollutant loads entering waterways. Reducing the runoff volume from a specific storm event can be beneficial for the control of erosion and flooding in minor watercourses such as creeks.

Retained stormwater may be made available for non-potable uses through a stormwater harvesting system, or removed from the surface drainage system through infiltration and/or evaporation.

1.11.12 Scour protection

The discharge of stormwater from outlets shall consider the dissipation of energy and scour protection. The following are minimum requirements.

Outlet Characteristics	Recommended Outlets Treatment
Outlet Q < 2 m^3 /s and/or Outlet V < 3 m/s and/or Outlet slope < 3%	Culvert headwall plus concrete apron plus 600 mm deep apron cut-off wall and rock protection as provided in QUDM
Outlet Q > 2 m^3 /s and/or Outlet V > 3 m/s and/or Outlet slope > 3%	Culvert headwall plus concrete apron plus 1200 mm deep apron cut-off wall plus an approved energy dissipation device as provided in QUDM

There are several types of energy dissipation devices ranging from plunge pools, extended aprons, ramps that induce hydraulic jumps etc. Chute blocks are however not permitted as an energy dissipation device.

Designers shall utilise the most up to date QUDM for the design of all energy dissipation structures. Energy dissipation structures must be avoided in urban areas due to their inherent size. Otherwise access must be limited through appropriate fencing.

The area surrounding outlet structures must be stone pitched. Dumped rock is not an acceptable alternative.

1.12 Design Details – Computer Modelling

The use of computer models is common place and expected during the planning and design of a stormwater management system. Good modelling practice is required to ensure accurate and reliable outcomes. Modellers must understand the limits and sensitivities of their models and the accuracy of the predicted outcomes. Models must be acknowledged as a coarse simplification of complex processes with their accuracy limited by terrain data and uncertainty in key parameters that can vary such as rainfall, roughness and blockage. Models must be calibrated or validated against a number of varying storms where data is available to provide confidence in the results. Although absolute flows and water levels can be subject to varying degrees of uncertainty, the difference or afflux between the model outputs for the before and after scenarios is expected to be reasonably accurate as any assumptions or inaccuracies will be present in both scenarios.

Each design that utilises model results will need, as a minimum, to be accompanied by a technical report that includes the following details:

a) modelling software utilised, including the version/revision number;
b) design/data inputs, including their source;
c) modelling methodology;
d) modelling parameters, assumptions and limitations;
e) results of any sensitivity testing of key parameters;
f) calibration/verification results;
g) model modifications undertaken if using Council's model packages (refer to Section 1.12.3);
h) quality checks including model log and error reporting files,
i) results including relevant mapping
j) interpretation and recommendations

Council is to receive the final models with all associated input data files and results. A model log describing the relevant model names, scenarios and key differences is to be included with the model.

Additional guidance on best practice computer modelling can be referenced in Australian Rainfall and Runoff (AR&R) and Australian Runoff Quality (ARQ).

Council has internal modelling expertise and prefers the use of runoff routing and hydraulic models as described below. Alternative models will be considered but it is recommended to receive Council's acceptance of the use of these alternative models prior to their adoption.

1.12.1 Hydrological modelling

Hydrological modelling is used to predict peak flow rates, flow volumes and hydrograph shapes for varying storm events and durations. Models can be based on individual rainfall events or continuous, long term simulations. Continuous models are usually used for assessing the impact to the hydrological cycle. Individual rainfall event simulations are typically used for the design of major stormwater systems. Dynamic or unsteady modelling is required to assess peak flow and storm volumes to understand the impact of changing floodplain storage and the time for flows to peak.

Hydrological modelling is to be completed based on the recommendations provided in AR&R.

Council's preferred hydrologic model is the Watershed Bounded Network Model (WBNM) developed by Michael Boyd, Ted Rigby & Rudi van Drie.

1.12.2 Hydraulic modelling

Hydraulic models are used to determine the area of inundation, flood level and flow velocity to assist with identifying flood hazards. Models can be either one dimensional with a defined flow path (either a pipe or surface/overland flow), two dimensional with an undefined flow path, or a combined one/two

dimensional model. Specialist three dimensional models may be applicable for complex hydraulic structures or water quality modelling.

It is recommended that all hydraulic modelling should be undertaken in accordance with the Regional Floodplain Database methodology. Relevant reports describing this methodology are downloadable from Council's website.

The DFE for Flood comprises the upper envelope of a number of storm/catchment scenarios as follows:

a) 1% AEP flood event using ARR design rainfalls
b) 1% Moreton Bay Design Storm (MDS) event which is a 15 minute in 270 minute embedded design storm (15min burst inside a 270 minute burst with storm 'wings' scaled down to preserve overall volume of an ARR design burst)
c) 1% MDS event with Moderate structure blockage – refer to report *Regional Floodplain Database - Floodplain Parameterisation* (SKM, 2012) report downloadable from the Council website.
d) 1% MDS event with 20% Increase in rainfall
e) 1% MDS event with 20% Increase in rainfall and increased downstream boundary (0.8m sea level rise for coastal models and 0.02% AEP event for inland models)
f) 1% MDS event with Medium Dense Vegetation changed to High Dense Vegetation and Low grass/grazing changed to Medium Dense Vegetation within the 1% AEP floodplain to reflect future revegetation.
g) 1% MDS event with Medium Dense Vegetation changed to High Dense Vegetation and Low grass/grazing changed to Medium Dense Vegetation within the 1% AEP floodplain and impact of increased residential development (Change in minor catchment fraction impervious) (this applies only to selected minor basins where urban development is a feature).

Council's preferred hydraulic model is TUFLOW developed by Bill Syme. However, in some cases alternate software may be justified depending on the nature of the hydraulic behaviour being assessed. The model complexity must match the complexity of the floodplain and catchment.

1.12.3 Regional Floodplain Database Model Packages

The Regional Floodplain Database model library includes fourteen coupled hydrologic and hydraulic models, one for each of the fourteen 'minor basins' within the Moreton Bay Regional Council area. These model packages are available for purchase and can be requested online via Council's Flood Check website https://www.moretonbay.qld.gov.au /floodcheck/

The following is provided when purchasing a model package for a chosen minor basin:

Hydrologic model - WBNM.

a) GIS files - Minor Catchments, Stream Reaches and Stream Junctions
b) Model run files
c) Model result files
    i) 14 ARI's for 10 storm durations;
    ii) 3 Moreton Bay Design Storm (MDS) simulations.

Hydraulic model - TUFLOW.

a) GIS Files - MapInfo MID/MIF input files
b) Model input files, run files
c) Model results files
    i) 14 ARI's for 3-4 durations (varies depending on the minor basin)
    ii) 10 scenarios using the MDS (including DFE scenarios)
d) Result file formats
    i) flt max grids for h, d, V, Z0, ZQRA, ZMBRC (Flood modelling) and Z9 (Storm Tide modelling)

ii) xmdf - Time series data for h, d, V, q, SP, Z0, ZQRA, ZMBRC (Flood modelling), Z9 (Storm Tide modelling) and any standard TUFLOW outputs
iii) WRB - WaterRIDE file containing information regarding DEM, velocity and water level

e) Landuse input files based on 2013 Aerial photography
f) Latest LiDAR (2014) (within the model code boundary) as well as modifiers for post LiDAR developments where applicable and available. One or more of the following formats can be used for the modifiers: txt, 12da, asc, MID/MIF, grd and tin.

MBRC does not provide models for the estimation of Overland Flow.

1.12.4 Water Quality Modelling

Site Based Stormwater Management Plans and development applications are to be assessed to meet the operational pollutant reduction targets of the State Planning Policy and Schedule 10 of the MBRC Planning Scheme using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC). The models must be developed in accordance with the Water by Design MUSIC Modelling Guidelines.

There are numerous modelling platforms for detailed catchment and in-stream water quality assessment and sediment transfer. Adoption and appropriate design methodologies are to be discussed with Council prior to undertaking detailed in-stream analysis.

1.12.5 Other models

Council may require as part of development conditions the modelling and assessment of other natural processes such as coastal erosion, groundwater and tidal dynamics. Computer models for these purposes shall be verified by an appropriately qualified expert as suitable for the intended application. Discussion with Council prior to selecting a modelling package is encouraged.

1.13 Erosion and Sediment control

Development and associated construction activities generally removes vegetation and exposes soils to erosive forces of wind and water. Although erosion is a natural process, accelerated erosion that produces large quantities of sediment is a considered a pollutant that can transport additional contaminants.

The prevention of erosion will provide better outcomes than simply managing sediment conveyed by stormwater. Development must be avoided in land areas identified with a higher risk of erosion. Direct stormwater discharges into waterways susceptible to bank erosion must also be avoided.

Erosion and sediment control for all phases (clearing, bulk earthworks, civil works etc.) and stages of development must be part any stormwater management strategy.

An erosion and sediment control plan (ESCP) is required to demonstrate that release of sediment-laden stormwater is avoided for the nominated design storm, and minimised when the nominated design storm is exceeded. The plan must address the design objectives listed in Schedule 10 of the MBRC Planning Scheme and PSP - Stormwater Management.

All erosion and sediment control practices (including any proprietary erosion and sediment control products) are to be designed, installed, constructed, operated, monitored and maintained, and any other erosion and sediment control practices are carried out in accordance with local conditions and appropriate recommendations from a suitably qualified person (CPESC).

Alternative or additional performance criteria for discharges from development sites as specified in local studies (i.e. a SBSMP or CMP) must be included in the ESCP. An Erosion and Sediment Control Plan forms part of a Site Based Stormwater Management Plan outlined in PSP Stormwater Management.

The Best Practice Erosion and Sediment Control Manual developed by the International Erosion Control Association must be referenced in the preparation of Erosion and Sediment Control Plans and the design of associated mitigation measures including temporary sediment basins.

1.14 Design Details - Coastal

1.14.1 Canals

All canals, revetment walls and associated facilities required in a canal subdivision shall be designed and constructed in accordance with the Canals Act and in accordance with the canal layouts approved by Council at the time of consideration of the preliminary approval under the Canals Act. Such design and construction shall meet the following minimum requirements:

a) The canal access from the adjacent channel shall be constructed to the approved depth and shall include appropriate structures to prevent infilling and siltation, ensuring stability of adjoining properties and improvement.
b) The beach profile shall be constructed for long term stability with due consideration to tides, boat wash and wind induced waves. Additional consideration of beach construction shall allow for ease and access to perform maintenance.
c) The seaward face of revetments (reinforced or mass concrete wall) shall align with the allotment Boundary. Reinforced concrete walls must be designed, with a minimum design life of 40 years. The footing of the wall shall be located minimum 300mm below L.A.T. for the site.
d) The location of revetments / walls shall be such to ensure that:
    i) The waterway provides a suitable navigation channel
    ii) Provides for reasonable boat storage on pontoons or jetties for each waterfront property.
    iii) Maintains the water quality within the waterway during normal tidal flows.
    iv) Midge populations can be controlled.
    v) Maintains flood conveyance and flood storage requirements during flood flows.

Engagement

Engagement with public authorities is necessarily more comprehensive in the case of waterfront developments. Design proposals shall not be reviewed by Council until all relevant approvals required by public authorities have been obtained. Relevant public authorities include:

a) Council shall provide allocated locations for services, but all further approvals are conducted through the relevant authority.
b) It is the responsibility of the developer to comply with all State relevant acts and requirements. It shall not be the responsibility of the Council or any acting officers to verify all details are in compliance. Some relevant agencies include:
    i) Department of Environment and Heritage Protection
    ii) Queensland Transport
    iii) Department of National Parks, Sport and Racing
    iv) Department of Natural Resources & Mines

1.14.1.1 General Requirements

There are general requirements pertinent to waterfront development which are applied by Council or other public authorities. These requirements include:

a) No adverse effect to flood levels in the area.
b) No adverse effect to erosion or deposition conditions within the existing environment.
c) Revetment walling is to be located with the property boundary.
d) Design of canals shall be undertaken to minimise maintenance including no exposed beaches and submerged rock armour at the revetment wall toe.
e) Design shall allow for maintenance access
f) Design shall allow for wet dredge spoil management including temporary storage, solar drying and off-site removal.
g) Maintenance of water quality
h) Requirements of all State government compliance is achieved.

1.14.1.2 Land reclamation

A detailed foundation investigation shall be carried out by a registered Professional Engineer Queensland (RPEQ) practising geotechnical engineer to determine the long term bearing capacity of the site. The investigation shall include the bearing capacity of the in-situ and fill components of the foundation. It shall predict the settlement of the finished surface through time (without structural loading). The foundation investigation shall specify any procedures or provisions to ensure that the foundation performance of the site will be suitable for the proposed types of site development in accordance with AS3798.

During construction of the site fill testing shall be carried out in accordance with the nominated processes in the chapter. All details shall be inspected by the authorised Moreton Bay Regional Council Engineer or nominated representative. The Council reserves the right to implement a qualified geotechnical engineer during the construction process to monitor the earthworks operations. All associated costs are to be borne by the developer.

The design of structural foundations must be carried out by a qualified practising structural engineer to ensure compatibility with the inherent foundation properties of the proposed site. Provision shall be made for the developer to provide certification that all allotments have met the bearing capacity strength of the original design characteristic for residential construction.

1.14.1.3 Planning Concepts

Consideration must be given to design of artificial waterways which are more natural in appearance than conventional rectilinear key type canal developments, exhibit superior mixing and tidal exchange performance and which permit straightforward maintenance.

The location of parks and reserves within the development must be judiciously selected. Location of parks and reserves at the head of canals is desirable.

Depths shall be constructed and maintained consistent with navigation and other requirements, in order to maximise tidal flushing and mixing by wind action. The development is to ensure that the construction and design provides long term access and usage of the canals without costly dredging maintenance. Canal depths shall allow for movement of siltation into and around the canal development and the effect the siltation has on canal batter shapes and pontoon placement.

The factors involved in selection of water depth for navigation and mooring areas are as follows:

a) draught of boat
b) underkeel clearance (UKC)
c) allowance for sedimentation.
d) batter slope
e) width of boat (deeper allowance to be made under boat)
f) width and make of pontoon (now and future designs)

Water quality within canals must be such that the following are not adversely affected:

a) occasional swimming and wading
b) boating
c) passive recreation
d) visual aesthetic acceptability
e) freedom from excessive plant and algal growth
f) the maintenance of a complete aquatic fauna and flora community.

1.14.1.4 Plan Geometry

Wherever possible, the design of the canal development must incorporate the following factors to promote optimal mixing and exchange:

a) Provision of bends and meandering canals, and elimination of poorly flushed pockets and coves;
b) Provision of additional tidal prism at the head of canals by creation of a lake or basin;
c) Modify any existing entrances if the canal development increases from that of original concept
d) Orientate channel openings to factor principal wind directions. Canal orientation with prevailing winds, tidal currents and wave action to minimise impact on canal bank

1.14.1.5 Waterway Depths

Canal centre depths throughout the canal system shall be uniform.

Depths must be sufficient for safe navigation by craft likely to use the waterway. Reference to be made Queensland Transport – Regional Harbour Master

The waterway depth shall be the greater of:

a) A minimum of 2.0 metres at Lowest Astronomical Tide; or
b) Subject to approval of a "design vessel" for the waterway, the minimum depth shall be determined by the draught of this vessel plus suitable allowances for:
    i) Under keep clearance;
    ii) Siltation; and
    iii) Applicable wave height or vessel wake.

Suitable allowance shall be made for sedimentation and bank stability in establishing the design canal depth.

1.14.1.6 Waterway (Canal) Widths

Two measurements for canal width can be distinguished:

a) navigation width: width of canal at the navigation depth
b) overall canal width: width of canal between the top of the revetment walls.

The navigation widths for Main Canals and Side Canals shall be sufficient for safe navigation by two way boat traffic respectively, taking into account the size of craft likely to use the waterway. Minimum navigation widths shall be used as a guide:

a) Main Canal 5 x Bmax or 20m whichever is the greater
b) Side Canal 3 x Bmax or 15m whichever is the greater
c) Where Bmax is the maximum beam of the craft likely to use the waterway.
d) Where any structures or moored craft encroach into the navigation width, a clear distance of 5 x Bmax and 3 x Bmax shall be provided in Main Canals and Side Canals respectively, measured between structures or craft moored on opposite sides of the canals.

The navigation width of the entrance channel shall be sufficient for safe navigation by craft likely to use the waterway taking into account the degree of exposure of the entrance, but shall not be less than 25m.

The overall width of any canal shall not be less than 50m.

The Department of Transport and Main Roads / Department of Environment and Heritage Protection may require that the overall width of canals be increased above the minimum value where it is considered that such widening is necessary to improve mixing and flushing characteristics.

Determination of the navigation and overall canal widths shall take into account bank and bed stability considerations. An allowance for pontoon design and type shall be considered for all tide levels and materials transported

Width of the canal shall allow for revetment wall on either side of the canal and the positioning of the moorings / pontoons at low tide for boats to anchor safely in the water and allow access to occur.

1.14.1.7 Waterway Length

Determination of the design canal length(s) shall take into account the following main factors:

a) flushing and water quality considerations
b) bank and bed stability
c) boat travel times.
d) Disturbance of PASS (Potential Acid Sulphate) material. Discussions to be held with Council regarding disposal locations and process for PASS material prior to implementation.

The maximum distance from the host waterbody to the end of the canal(s) shall not exceed 1 kilometre unless studies are undertaken which establish that water quality will be satisfactory. All details are to be provided under the Development Application.

1.14.1.8 Waterway Cross Sections

The canal cross-section and edge treatment shall be designed in accordance with sound engineering practice by a registered Professional Engineer Queensland (RPEQ) civil engineer, taking into account the type of soil conditions, the likely range of water levels including long term variations, and the applied forces. All details outlining the tide access to pontoons attached to private properties (or potential for) and the need to reduce maintenance dredging. Engineering studies demonstrating the adequacy of the canal cross-sections and edge treatment shall be made available to the Department of Environment and Heritage Protection.

1.14.1.9 Underwater batters at canals and shorelines

Stormwater outlets into beach type canals are to be submerged in the canal waters. All sections of stormwater pipe submerged or subject to full flow conditions shall be increased by one standard size to allow for long term growth of marine build up or sediment.

All pipes shall comply with material required for salt water conditions.

1.14.1.10 Stormwater management

The proponent is required to adequately demonstrate that the proposed method of stormwater management will not adversely affect water quality within the canal development and host waterbody, or lead to problems associated with siltation and erosion.

The canal allotment shall be graded to ensure as much runoff as possible is directed to the street where it may be collected and then directed into the canals through properly designed stormwater outlets. The preferred system of stormwater discharge is by means of a "drowned outlet" constructed below beach level, incorporating suitable scour protection.

Wherever practical, stormwater outlets shall be located at points of maximal flushing, or directly within the host waterbody.

For canals over 150m in length it is preferred that stormwater outlets shall not be located at the heads of dead-end canals. Outlets must be located a distance from the canal ends (i.e. 25% from the end) to ensure stormwater can move with tidal action, and not present any health concerns with water quality and length of canal.

Suitable allowance for sedimentation near stormwater outlets shall be made in the design of the canal cross-section and/or access made available for future maintenance dredging.

Suitable temporary sediment control devices shall be installed during the construction phase to ensure that sedimentation within the canal system is minimised and sedimentation does not occur within the host waterbody

1.14.1.11 Flood control structures

Flood control structures usually include a system of canals and weirs which are to be approved by the Environmental Protection Agency. Usually detailed designs for flood control structures are commenced only after the overall canals and flood structures have been mathematically and physically modelled and approved by the Environmental Protection Agency and Council. Preliminary plans are usually prepared as part of a flood study which involves modelling procedures.

Designs must ensure that the proposed works and any raising of the land will not result in any significant increase in flood levels in the area

1.14.1.12 Tidal Influences

The level of study of tidal hydraulics necessary to adequately demonstrate the impact of the proposed development on tidal hydraulics, and the effects of the tidal hydraulics on the development, is dependent on a number of factors. It is important that the proponent seek early consultation with the Environmental Protection Agency

The proponent shall assess variations in the tidal characteristics of the host estuary at the development site taking into account cyclic and long term changes in: estuary shoaling and scour, entrance stability, hydrologic input, mean sea level, and any engineering works (such as large scale estuary dredging, entrance works, or other canal subdivisions) proposed or approved by all government authorities. The implications of these changes to the design and functionality of the canal subdivision shall be established and accommodated.

The proponent shall establish the tidal levels at the proposed development site. These levels may be based on existing information supplied by the EPA, where available, or measurements undertaken on behalf of the proponent by a suitably qualified surveyor or civil engineer.

There is no minimum acceptable tidal range below which canal developments would not be considered. The degree of tidal flushing will however reduce as tidal range decreases, and this effect must be considered in the water exchange and mixing studies required by the EPA and outlined elsewhere in the guidelines.

1.14.1.13 Water Quality Influences

Consideration must be given to enhancement of water circulation and/or exchange by the following additional means:

a) provision of an additional entrance(s), not necessarily navigable
b) provision of additional tidal prism by creation, for example, of a lake or basin at the head of the canal(s)
c) provision of bends, curves and island features
d) elimination of poorly flushed end canals
e) alignment of the canals in the direction of prevailing winds
f) mechanical assistance.

There would appear to be benefit in aligning canals in the direction of prevailing winds if this is possible, in order to maximise mixing and exchange processes.

Fetch lengths in the direction of strong winds must be minimised to mitigate the potential adverse impacts of wind-generated waves.

The effectiveness of the wind in developing vertical secondary mixing circulation is increased by increasing the width of the water surface in the canals. It follows that broad canals, and lake-type developments, will exhibit enhanced vertical secondary mixing

1.14.1.14 Erosion and sedimentation influences

Canal developments are to be constructed to requirements set out as guidelines by Council.

Long canals with sandy shorelines, and aligned with prevailing winds, are likely to experience littoral drift. Generally speaking, the length and alignment of canals must be carefully considered and the potential for littoral drift balanced against the advantages of wind action for promotion of mixing of canal waters.

Shoreline structures which extend across the littoral drift zone, e.g. some stormwater outlet designs, must be avoided where relatively high littoral drift rates are anticipated, except where special provision has been made to mitigate beach erosion.

In assessing the sediment load carried by stormwater outlets from a given catchment area, it is reasonable to adopt the following sediment quantities per hectare of catchment area per year:

a) partially developed urban catchment 5.5 tonnes/ha/yr
b) fully developed urban catchment 1.5 tonnes/ha/yr
c) rural areas 0.3 tonnes/ha/yr

Stormwater outlets must be arranged so as not to directly or indirectly cause erosion or local scour. Consideration is to be given to construction of the stormwater outlets and their location.

1.14.2 Revetment Walls

Revetment walls are to be designed as retaining walls certified by a practicing registered Structural Engineer (RPEQ) and submitted to Council for approval. This does not apply to non-load bearing concrete edge strips.

Filling is to be composed of material not injurious to the health of the neighbourhood and shall comply with Council's requirements. Fill to be constructed with good engineering and construction practice.

Determination of the full construction height, structural adequacy and stability of the wall or edge strip shall take into account an erosion allowance in front of the wall or edge strip.

1.14.3 Jetties, Pontoons and Boat Ramps

Where jetties and pontoons are proposed for canals which serve as floodways, the effect of these structures on the hydraulic performance of the canals shall be taken into account in the hydraulic design of the canals.

Jetties, pontoons and boat ramps shall be designed in accordance with sound engineering practice by a registered Civil Engineer (RPEQ) to satisfactorily resist all dead loads and applied live loads.

Floating pontoons shall be designed to safely accommodate grounding without damage to the structure. Alternatively they shall be designed to float under design load conditions at all tides and with a further minimum allowance of 200mm of siltation above the design bed profile at the pontoon location.

Consideration shall be given to the effect of flood currents and debris loading on structures proposed to be located within canals which will serve as floodways.

Account shall be taken of jetty pontoon, ramp, etc. design in assessing the required width of the canals.

Public boat launching facilities and marina facilities are generally regarded as unsuitable to a residential canal development because of the difficulty of ensuring adequate privacy for residents. Such facilities

must only be considered where adequate and comprehensive environmental safeguards can be incorporated in the design of the development.

Public boat launching facilities and marina facilities shall be developed in accordance with the Guidelines in Section 86 of the Harbours Act.

Where it is proposed to construct public boat launching facilities within a canal development, consideration shall be given to siting of the launching facilities so as to minimise any adverse noise impacts on adjacent development due to the particular hours of use of the facilities.

Where it is proposed to construct marina facilities within a canal development, consideration shall be given to siting of the marina and design of the marina so as to maximise tidal exchange between the marina basin and the host waterbody. Ideally, marina basins must be located separately from residential canals and close to the entrance of the overall development. Canals shall be designed such that commonly available pontoons (3.5 metres wide, dry berth type) shall have a minimum clearance at LAT of 0.5m from any part of the pontoon and any part of the canal embankment.

1.14.4 Canal Bridges and Structures

Bridges and structures shall be designed in accordance with the Specification for Structures and Bridge Design. The design life shall be 100 years and the serviceability design flood shall be the 5% AEP storm event. The ultimate limit state, that is the capability of the bridge to withstand a flood without collapse, shall be the 0.05% AEP storm event.

Where canals are narrowed at bridge locations, it is likely that complete rock protection of the banks and bed of the canal will be required. Lowering of the canal bed to reduce velocities may also be required.

The vertical clearance of any proposed bridge must be checked with the Waterways Authority, and shall not be less than height required for the “design vessel” at HAT.

There must be sufficient clearance between the canal invert and the bridge to allow for maintenance equipment to pass under the bridge.

Where a canal entrance cuts pedestrian access along a public foreshore (e.g. by removing the intertidal area) then a footbridge must be provided to ensure continuance of public access and amenity.

Integrated Design - Appendix D
Landscape Design & Street Trees

For State Approval - Major Amendment 1 - December 2017

1 Contents

2 Introduction

As the scale and intensity of development continues to rise to meet population, economic and land supply pressures, Council recognises the importance of good quality landscape design in providing attractive, comfortable, safe and sustainable urban environments.

As part of an approach to facilitate higher development yields through increased allowances in density, site cover and reduced setbacks, the importance of landscaping to soften built form, add visual interest and provide engaging and functional spaces should not be underestimated.

This appendix provides the criteria, standards and guidance material for planning, designing and implementing successful landscapes in both private and public development. In all instances provision of infrastructure and services are required to be in accordance with the relevant Australian Standards and MBRC approved standard drawings, unless otherwise approved by Council.

For criteria, standards and guidance material concerning the design of public open space, park and civic spaces please refer to Appendix B - Open and Civic Space Design.

3 Information to be included in a Landscape Plan

Landscape plans will often be required to address criteria within the planning scheme or as a condition of a development approval to accompany subsequent applications such as Operational work.

In some circumstances, such as landscaping for gardens within private developments, a Landscape concept plan may be all that is required to justify compliance with criteria within the scheme. However, where soft or hard landscaping is in proximity or is being proposed in proximity to structures, services, trafficable areas or the like, the landscape plan is to be certified by a Registered Landscape Architect (as recognised by the 'Australian Institute of Landscape Architects'), that all information provided on the plan is correct and can be implemented onsite without compromising the safety and functionality of any services, structures or the like. The plan is also to confirm that services and structures as part of the development do not compromise the ability for plantings to achieve their desired purpose.

It is considered that all Landscape plans submitted which include planting within the road reserve such as street trees, rain gardens, and planting within proximity of retaining structures and underground services must be accompanied by Registered Landscape Architect certification. In some instances, (e.g. shade trees within car parks or in close proximity to publicly accessible walkways, parks or civic spaces) an independent Arborists certification may also be requested.

Landscape plans are to contain the following information:

a) A site plan showing:
   i. the existing contours and proposed finished levels of earthworks;
   ii. the location of existing and proposed buildings and other structures, including any landscaping or recreation features, on the site;
   iii. the location of existing or proposed storage areas, including vehicle storage areas;
   iv. the location of all existing and proposed underground services;
   v. the location of existing footpaths, trees or other existing landscaped areas to be retained or removed;
   vi. the location of all vehicular and pedestrian entries and exit on the site, and the internal layout of pathways, driveways and parking areas.

b) A planting design plan identifying the location of all plants and including a Plant Schedule. A Plant Schedule will:
   i. be divided up into trees, palms, shrubs, ground covers, climbers and ferns;
   ii. include botanical names in alphabetical order and used in conjunction with common names. Plant coding is appropriate to avoid plans being cluttered with lengthy annotations;
   iii. identify the quantity and pot size of each individual species used in the planting design;
   iv. identify the height and spread of trees at planting;
   v. identify spacing of all species and staking (if necessary);
   vi. identify any proposed irrigation strategy where irrigation is required.

c) For Landscape Concept Plan packages identify the following through the use of scaled plans, sections and details:

   i. identification and description of the location and extent of views, and a description of local character and visual quality;
   ii. description and location of existing and proposed pedestrian and vehicular access routes and linkages into and around the site;
   iii. description of constraints (soil type, rock, location of existing roads and infrastructure such as water, sewer and stormwater drainage) that may impact on any landscape works associated with future development;
   iv. description of topographical features including slope analysis and location of any outstanding landscape features (including landmarks and built form);
   v. description of prevailing winds and any other climatic conditions that may impact on the landscaping works associated with development of the site;
   vi. existing features on the site to be retained or removed e.g. vegetation, built form;
   vii. any structures or significant vegetation on adjoining properties that could impact on the site;
   viii. the location of any buildings, retaining walls, structures (including electricity transformers, fire boosters and the like) site furniture and an indication of their form and character (including entry statements);
   ix. existing contours and proposed finish levels for earthwork and extent of cut/fill or retaining walls necessary for development of the site;
   x. surveyed location and botanical name of existing vegetation, including species' height and spread, specifying vegetation to be retained and that to be removed;
   xi. notations of design intent for any landscape works, including desired character themes and proposed function;
   xii. location of softscape areas including buffers, screens; rehabilitation areas, any garden bed areas and delineation of principle hardscape areas;
   xiii. notation of potential proposed species for all areas to be planted (e.g. Native, exotic, feature planting, form and colour;
   xiv. proposed fence size and material;
   xv. surface, subsurface and drainage details associated with landscape works.

d) For Detailed Landscape Plan packages identify the following through the use of scaled plans, sections and details:
   i. a Plant Schedule divided up into Trees, Palms, Shrubs, Ground Covers, Climbers, Ferns etc.;
   ii. botanical names are to be in alphabetical order and used in conjunction with common names;
   iii. quantity and pot size of each individual species used in the planting design are to be included on the Plant Schedule;
   iv. height and spread of trees at planting is to be included on the Plant Schedule;
   v. spacing of all species and staking (if necessary) is to be included on the Plant Schedule;

vi. all species used and their planting locations are to be identified and notated graphically on the drawing by either full botanical name or by code which will be referred to on the plant schedule. The plan and plant schedule is to include plant coding where necessary to avoid plans cluttered with lengthy annotations;
vii. the location of any buildings, retaining walls, structures (including electricity transformers, fire boosters and the like) site furniture;
viii. specific construction details of surface treatment, edging, planting areas, turf areas, pavements, retaining walls, site furniture, fencing and any structure associated with the landscape works;
ix. proposed finished levels for earthworks, batters, retaining walls, pavements, turf field gullies;
x. a Maintenance Program is to be included as part of the information accompanying the Detailed Landscape Plan. The maintenance program is to address softscape and hardscape and reinforce the overall philosophy and objectives of the landscape design and include accepted horticultural practices and codes/best practices necessary to establish the proposed landscape works in the noted maintenance period.

e) All plans are to contain:
i. plan numbers, date and revisions;
ii. address and name and Job/File Number of project;
iii. client's name and address;
iv. designer's name and address;
v. locality plan including any adjoining roads, waterways and land uses;
vi. north point;
vii. real Property Description;
viii. a suitable scale – 1:100, 1:200, 1:500, 1:750;
ix. a legend;
x. be produced on a standard A0, A1, A2, A3 or A4 sheet of paper.

4 General planting design, layout and form

4.1 General

Generally, plants are to be arranged to ensure an even and attractive coverage of vegetation across all designated planting areas, to provide for visual interest, way finding, shade, screening, and weed suppression whilst ensuring that public safety is not compromised.

Root systems and mature height and width of the vegetation are to be considered to reduce the imposition on adjoining pathways, roads, infrastructure/services and structures. Similarly, the selection and planning of shrubs and trees is to be undertaken with care to ensure that sightlines and safety for users of the landscape spaces are not compromised. Crime Prevention Through Environmental Design (CPTED) principles are to be applied in the interests of public safety and Council's duty of care.

Plants used are to be predominately local, native species, however Council recognises the cultural association of some exotic species in urban areas and may approve their use where appropriate.

Where wildlife habitat needs have been identified, plant selection which enhances wildlife movement opportunities are to be incorporated into landscape design of both the public and private realm. Design principles may include using gum trees as feature trees where space permits to provide refuge in urban ecological corridors and the use of wildlife friendly fencing.

Land form is also an important consideration during the Landscape design process, with gradients, batters, and retaining features needing to be adequately designed and integrated into the Landscape to address access, safety and maintenance outcomes.

4.2 Plant Size

At the time of installation selected species are provided at an appropriate size to efficiently achieve its proposed function, while ensuring its viability. General pot sizes are listed in Table 1 below, with an approximate resultant size of plant shown on Figure 1. In areas of high visual impact, screening areas and buffers, larger and more advanced stock may be required to be utilised to achieve a stated outcome within the planning scheme.

Table 1: Suggested General Pot Size

Landscape Type	Pot Size
Groundcovers	140mm Diameter Pots (Minimum)
General Shrubs & Trees	200mm Diameter Pots (Minimum)
Shade & Feature Trees in Car parks and Private landscapes	45 Litre Pots (Minimum)
Street trees within verge	45 Litre Pots (Minimum)
Street trees within build-outs or wider verge areas (e.g. park and civic space frontage)	100 Litre Pots (Minimum)
Revegetation Areas	Tube Stock

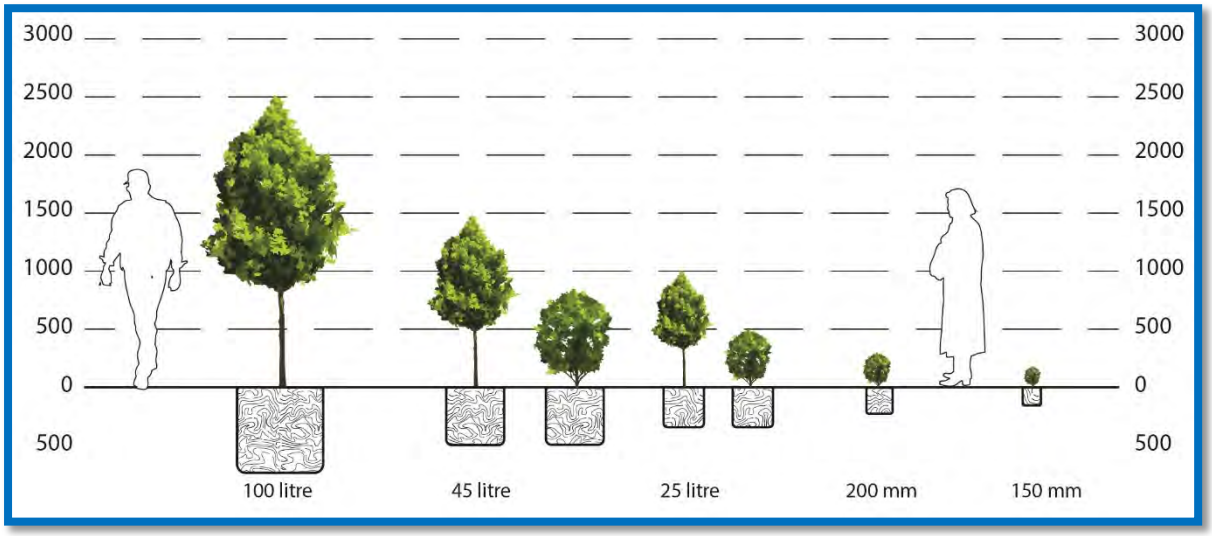


Figure 1: General pot size

4.3 Plant Density and Layout

Plant density is required to be adequate to suppress weeds, provide full visual cover of garden beds and discourage access and development of shortcuts through garden beds. Figure 1 below provides an example of inappropriate versus appropriate planting density. Planting is to have a minimum planting ratio/density as per table 1 below:

Vegetation Type	Number
Tree	1 per 5m^2
Shrub	1 per 1m^2
Ground cover species	3 per 1m^2

Table 2: Minimum planting ratio (subject to individual species performance)

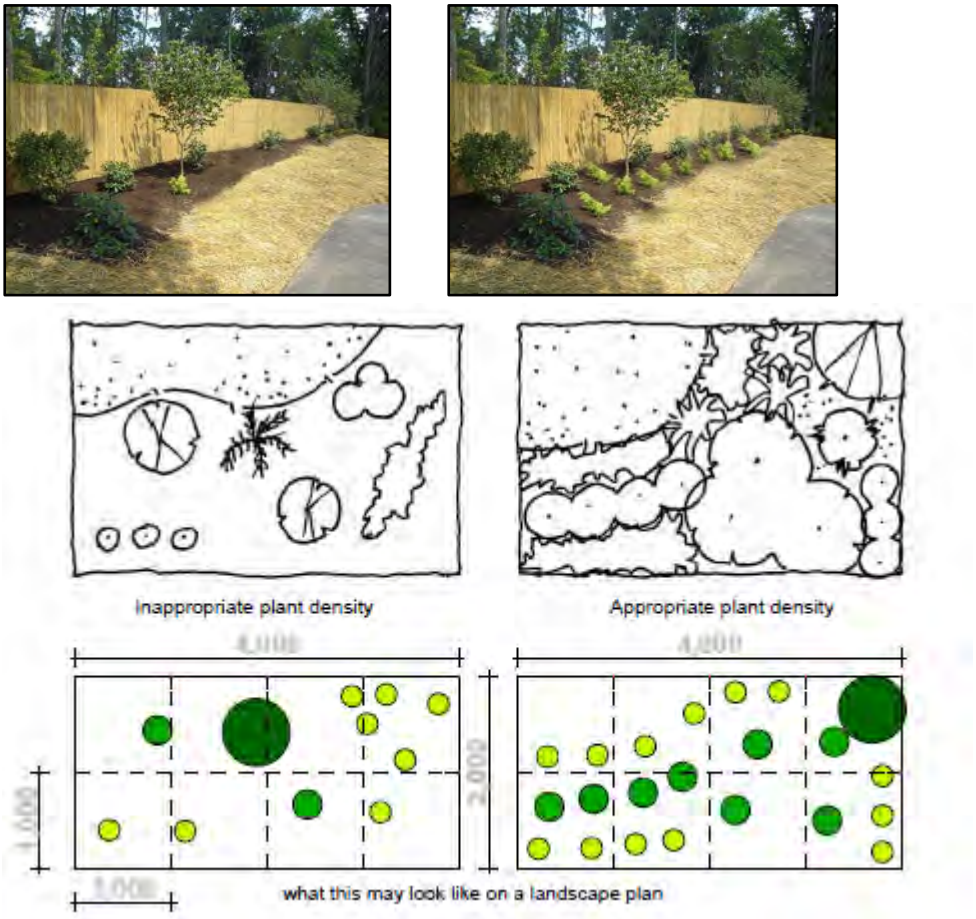


Figure 2: Inappropriate plant density vs appropriate plant density

Ideally, designers should adopt a tiered planting approach to achieve a successful plant design and form. As indicated in the Figure 3 below, taller trees and shrubs are to be used to provide shade, scale and vertical emphasis, while smaller shrubs, grasses and groundcovers are used to suppress weed growth, lower maintenance costs and provide an articulated depth to landscape features.

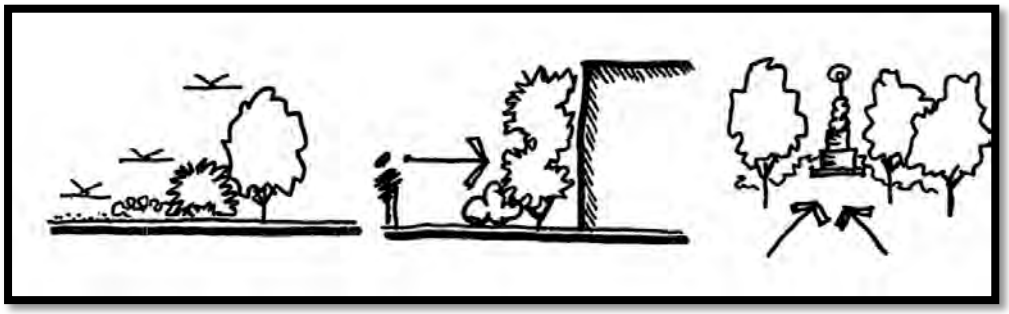


Figure 3: Tiered Planting

4.4 Plant Selection and Species

When considering plant selection as part of landscape design, the designer is to ensure:

a) the design uses predominantly naturally occurring local native species from the Region, incorporating koala habitat trees as street trees or features trees where connectivity is required within a mapped environmental area or corridor;
b) hardy, long lived perennial species are to be utilised and annual species avoided, particularly where landscaping occurs in public areas managed by Council. If annuals are proposed in landscaped areas, a rigorous maintenance regime is to be provided for assessment ensuring the function of the space will be maintained;
c) garden beds are to contain a suitable and sustainable combination of trees, shrubs and groundcovers to create visual diversity. Where landscaping is undertaken on public land, Council may consider only tree planting options in intensive urban spaces where visual connectivity is required and it is not practical to achieve dense low level vegetation;
d) plants that have been grown to a standard that allows them to establish and grow to maturity are to be provided;
e) plant selection will be based predominately on the use of species indigenous to regional ecosystems found in the local area, sourced from local shire provenance or in the case of named varieties or cultivars, bred from species not identified as invasive.

Species selection must have regard for:

a) the mature size of the species, particularly in those areas of high bushfire risk, adjacent to rail corridors or major roads, power lines, residential areas and substations. Large trees are to be located 1.5 times the clear fell radius away from essential infrastructure in these instances, unless otherwise approved by Council;
b) the growing media volume and depth available to sustain mature growth;
c) the susceptibility of the species to poor drainage;
d) flower, fruit and leaf litter issues;
e) the pest and disease management requirements of the species in their proposed location;
f) landscape character and amenity; and
g) shade considerations and other ongoing maintenance requirements.

Plants that are not to be planted in the region due to invasive or destructive characteristics are listed in Part 6 - Inappropriate Plant Species for General Landscape Use.

4.5 Land Form

In the design of landform as part of a landscape plan, the designer is to ensure:

a) gradient transitions are to be shaped to allow a variation of mowing patterns over a given area without causing scalping or excessively long grass;
b) mounding on the high side of pathways laid on low permeability soils may require subsurface drainage at the path edge to prevent flooding or siltation over the path;
c) turf adjacent to paths must be flush to mitigate drop off from the path which can lead to trips and falls;
d) mounding is designed and constructed to minimise impacts on downstream properties or vegetation and minimise impacts to site drainage;
e) mounding is decompacted to a depth of 150mm by surface ripping prior to the application of soil, mulch or turf;
f) batters, steep rock slopes and retaining walls are designed, constructed and stabilised for function and durability, to minimise adverse impacts to the natural environment and adjoining premises caused by erosion or siltation and to protect the safety of residents and maintenance staff;

g) where sustainable vegetative cover is not achievable on extreme slopes, retaining walls will be required. Retaining walls over 1.0 metre high must be designed and certified by a suitably qualified and experienced Structural Engineer and are to be approved by Council prior to works commencing;
h) the toe of any batters and associated drainage are to be contained within the boundaries of the development site and are not extended onto neighbouring lands or into adjoining vegetation protection zones;
i) retaining wall surfaces prone to unsightly graffiti will be required to be coasted with an anti-graffiti material or screened with appropriate planting.

Maximum slope requirements for specific landscaped finishes are provided in the following table. Slopes greater than 1:3 will require civil design, carried out by a suitably qualified RPEQ.

Landscape Finish	Maximum Slope
Turfed Areas	1 in 4
Recreation Land	1 in 6
Garden Areas	1 in 3

Table 3: Maximum Slope Requirements Plant Selection

4.6 Materials and Media

In the design of materials and media for use in landscape planting the designer ensures:

a) a minimum 450mm finished depths of topsoil is required across the entire vegetated area for intensive urban landscapes, medians and roundabout landscapes;
b) drainage is to be provided to all garden beds particularly in centre medians and road verges;
c) in ground planting areas are cultivated to a minimum depth of 300mm including subsoil cultivation and de-compaction measures;
d) planting media, mulch and other landscaping materials are free of pests (including declared and environmental weeds) and are appropriate for the ongoing growth of the proposed species;
e) the use of recycled materials is encouraged where safe and appropriate; and integrated into the landscape design;
f) to ensure the long term viability of the landscape and to reduce maintenance, durable materials are utilised in the design;
g) to reduce weed growth and maximise water retention, planting areas are mulched to a minimum depth of 100mm with organic or appropriate inorganic mulch;
h) where native vegetation is unavoidably cleared, habitat features such as hollow logs are to be harvested to enhance remaining and newly established habitat areas.

4.7 Maintenance

The maintenance of planting is minimised by suitable species selection and even mulch coverage. Landscape is designed with consideration for ease of access to maintain all landscape elements. The following considerations are required:

a) landscaping is designed to have a low water requirement and utilises appropriate species that do not require permanent irrigation after the establishment period. Effective use of rainwater is required;
b) landscaping is designed and constructed so the space can be efficiently and effectively maintained with low intervention rates.

4.8 Irrigation

Drought tolerant plants are to be used in the first instance however where irrigation is required to effectively maintain the development landscape, because of species chosen or harshness of the micro-climate, an irrigation system is to be installed, tested and commissioned by an irrigation consultant. Irrigation works are to be designed and installed utilising best management practices whilst taking into consideration future maintenance costs to the asset owner and the safety of the asset users.

4.9 Edging

Edging is designed to provide adequate separation between turf and gardens; to contain playground and fitness station soft fall zones; to separate turf and gravel swales; and to provide safety for maintenance staff and other user groups. Concrete is the preferred material for edging council owned lands and timber edging is not to be used where adjoining or within Council managed lands.

4.10 Shade

Landscape design provides shade in a manner that maximises user health and safety i.e. shade trees located adjacent to footpaths and situated around recreation areas. The integration of existing tree vegetation into the design helps to maintain canopy coverage and reduce impermeable surface heat reflectivity creating cooler urban spaces.

Natural shade is Council's preferred outcome and hard shade solutions require approval due to increased long term maintenance costs and vandalism risk. Play facilities in particular should be located in close proximity to retained vegetation to maximise natural shade without compromising tree health.

5 Specific Design Requirements

5.1 Entry Statements

Development entrance features or estate names are an optional element that can be included in landscape plans to define and promote estates and enhance the character of the streetscape. Where the applicant chooses to include entrance statements details of the feature or structure are to be included in the landscape plans and submitted to council for approval. The following criteria applies where a development includes such features:

a) entry statements are established in a manner that allows for appropriate management and maintenance;
b) designs are to take into consideration pedestrian and traffic safety and be compatible with surrounding area's character and streetscape;
c) entry statements are to be located wholly within private property;
d) entry statements are to be treated with an appropriate anti-graffiti product;
e) short term entry statements for marketing purposes are to be removed by the developer prior to the granting of off maintenance;
f) vegetation is to be low maintenance and preferably local native species;
g) long term entry statements must be made of durable, long life, low maintenance materials, soundly constructed and with engineered certification where warranted.

Council reserves the right to condition the removal of the entry statement at the developers expense at the conclusion of a project.

5.2 Street tree planting within Council road reserve

Trees provide a wide range of aesthetic and environmental benefits. They increase the biodiversity and amenity values of urban environments, can increase property values and reduce urban temperatures.

Street trees should be planted at the following minimum rates:

Zone / Precinct	Minimum Rate
General Residential **Rural Township – Township Residential**	1 per lot frontage (maximum 25 spacing)
Rural Residential	1 per 25 Metres
Centre **Rural Township – Township Centre**	1 per 25 metres
Industry **Rural Township - Township Industry**	1 per 50 metres

Table 4: Street Tree Planting Rates

Street trees are to be planted in build outs, within the verge and within footpath cut outs or a combination of depending on road type and cross section. Refer to Appendix A Roads Streets and Utilities. Refer to Appendix H for standard drawings on planting detail and Appendix C for water sensitive urban design inclusions.

General criteria:

a) Use of indigenous species local to the area is to be encouraged wherever possible and practical.
b) Ensure 10m spacing is achieved generally where practical, but not exceeding the maximum spacing as specified in Table 4 above.
c) Be a mix of species unless otherwise approved on a Landscape Plan. Species selection is to avoid the use of Problem Species or planting monocultures (refer to Section 3).
d) Make use of existing streetscape character including existing view lines.
e) Be placed in a location that is unlikely to pose future infrastructure or maintenance access issues.
f) Be provided with a minimum of 1.2 metres of clear verge width to ensure enough space for root growth and stability.
g) In high pedestrian traffic areas, a higher rate of tree planting or additional street trees in select locations may be required to provide adequate shade and pedestrian amenity.
h) Location and species selection is to be mindful of planned street infrastructure such as traffic signs, street lighting and underground services.
i) Significant existing trees are to be identified and incorporated into parkland and road reserve planting where possible and once assessed for form, function and safety.
j) Generally street trees will be planted at regular intervals and at a density that will provide a sense of continuity and scale to the streetscape.

5.3 Planting in Car Parks

Council requires the incorporation of landscaping in car parks to provide shade and ameliorate the micro-climatic temperature extremes of expanses of hard stands, improve the visual amenity of car park and complement the landscape character of adjoining streetscapes.

In considering landscaping within car parks the designer ensures:

a) shade trees are provided at a rate of not less than one shade tree per six car parking spaces. Council may consider a reduction in the rate of provision within car parking bays, where a greater overall density within landscaped areas of a development can be achieved, particularly where within WSUD landscapes;
b) trees within car park areas are to be able to attain a minimum clear trunk height of 2m at maturity;
c) a minimum 2m wide landscaped area is provided along any boundary of a car park that adjoins publicly accessible walkways, parks or civic spaces. For residential development a minimum 1m wide landscaped buffer is provided along any boundary of a car park that adjoins another residential zoned lot;
d) connected islands of planting areas accommodating shade tree species throughout the car park are provided. The planting of shade trees within small garden areas (e.g. $1m^2$ diamonds) is to be avoided unless engineered soil structures are used with sufficient interconnected and free draining soil volume for sustained plant growth,(typically not less than 8 cubic metres per tree), and certified by an independent Arborist;
e) continuous runs of more than 10 parking bays without a shade tree is not permitted;
f) trees and gardens are also to be located adjacent to speed control devices to reduce incidences of rat running;
g) the provision of planting areas on top of podium levels and on the roof level of car parking structures is encouraged to reduce the visual dominance of the car park area;
h) all planting areas within car parks maintain adequate sight lines for pedestrian safety and traffic visibility;
i) ensure design maximises natural surveillance and pedestrian visibility and ensure that there is safe and convenient pedestrian access;
j) optimise shade tree planting patterns to minimise glare and maximise shade;

k) the landscape design and construction of car park planting areas provide appropriate growing media volume and drainage to promote healthy and ongoing growth. Suggested cultivated media depths of planting areas within car parks are as follows:

Area	Media Depth (mm)
Garden Beds	300
Tree Planting Areas	450
Median / Island Beds	450

Table 5: Suggested Cultivated Media Depth for Car Park Planting

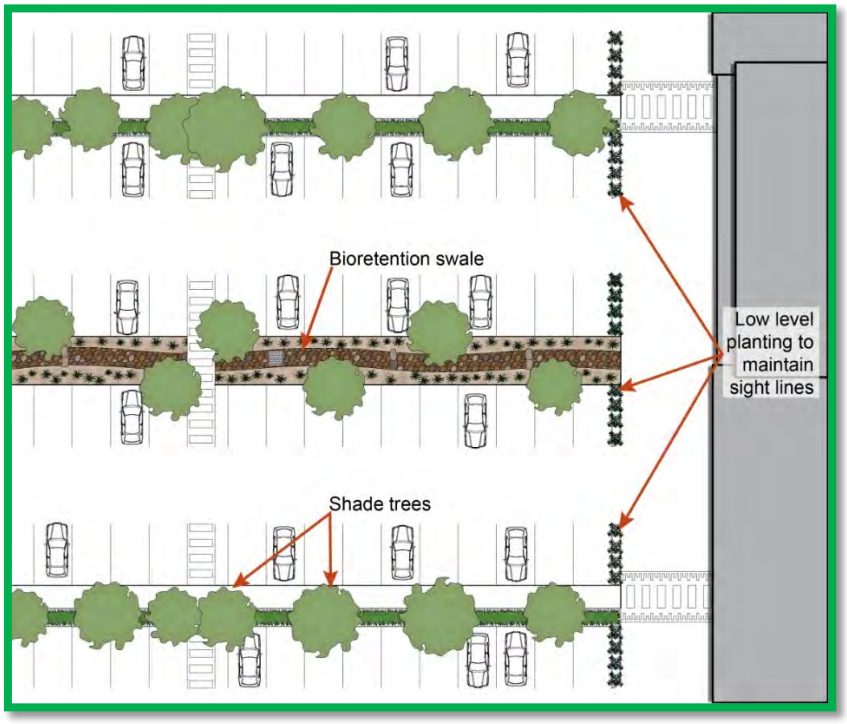


Figure 3: Example of good car park design (above)

Figure 4: Example of bad car park design (above)

5.4 Streetscape Treatment & Screening within private property

To address the streetscape, a landscaped buffer is to be provided within the property boundary with a minimum width (unless specified otherwise in the Planning Scheme or as required to screen the height of particular development i.e. acoustic fencing) as identified in the Table 6. This is to be provided along the entire length of frontage excluding those areas required for site access (both vehicular and pedestrian), outdoor dining or active building facade purposes. Where land is required for road widening or realignments, the minimum width of landscaping is to be provided in addition to this widening. Council may accept land required for landscape screening of structures such as acoustic fencing, to be handed over to Council for road purposes where it is deemed inappropriate for maintenance to be undertaken by private land holders.

Land Use	Minimum Width (m)
Industrial	2
Commercial	2
Dual Occupancy	2
Medium Density Residential	2
Relocatable Home and Caravan Parks	2
Service Station	2

Table 6: Minimum Landscape Buffer Requirements in Relation to Land Use

The streetscape treatment buffer is to contain a suitable combination of trees, shrubs and groundcovers (see Table 2) to create visual diversity, soften the built form and promote a green subtropical character. The retention of existing mature trees within the streetscape landscape buffer is maximised to retain the streetscape character. In some situations, street frontage landscape buffers may contain some gaps in vegetation coverage, for CPTED and better commercial exposure. The use of more groundcovers instead of larger shrubs in these instances may be appropriate to maintain surveillance of the street.

No buildings, other structures, goods storage areas, refuse storage areas, items of plant, loading unloading areas, parking or service vehicle facilities are to encroach upon the buffers required by this section.

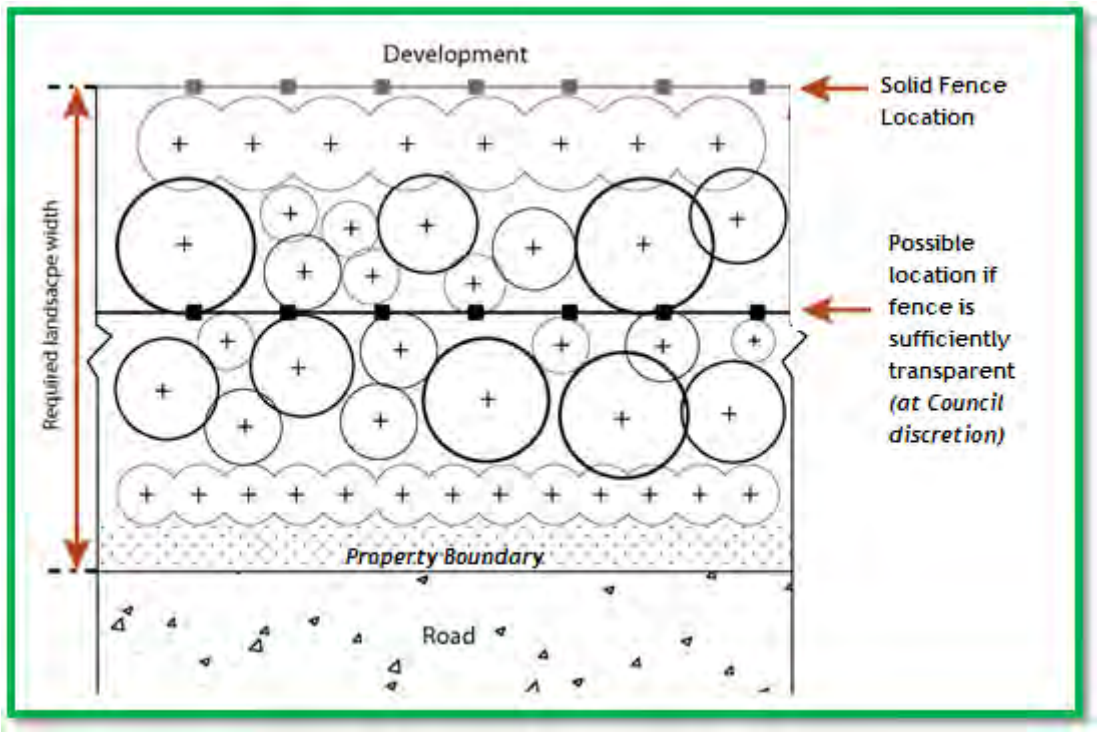


Figure 5: Recommended fence location for street boundary fencing

Where fencing is also proposed along the frontage of a site, it is to be located behind the minimum landscape buffer width when viewed from the street. Where fencing contains large gaps or is sufficiently transparent, Council may allow for it to be located within the landscape buffer width.

Where bio-retention areas are to be included within buffer areas or along the frontage of the site, they are designed with a high visual amenity and provisions to accommodate a combination of suitable tree, shrub and groundcover species to achieve screening and buffering of the development.

5.4.1 Screening and Buffering

Planted buffers are used to provide:

a) visual screening to undesirable land uses, acoustic and other types of fencing, and busy road frontages;
b) protection and enhancement of environmental values associated with vegetation, natural habitat and watercourses;
c) refuge for wildlife;
d) serve as windbreaks.

Buffer planting is to use species with demonstrated ability to be sustainable with low maintenance intervention. Council's preference is to use native species with limited use of exotic species where appropriate.

Where a landscape buffer is required to screen a structure, acoustic fence or the like, the buffer is to have a width that is able to accommodate vegetation that can grow to a sufficient height to screen or soften the height of the development that requires screening. Table 7 provides the minimum width of buffer to achieve a desired screening height, which is approximately shown on Figure 7.

Screening Height (m)	Buffer Width (m)
> 8.0	8.0 to 10.0
8.0	5.0
5.0	3.0
2.5 (Maximum)	2.0
1.2 (Maximum)	1.0

Table 7: Screening Height in Relation to Landscape Buffer Width

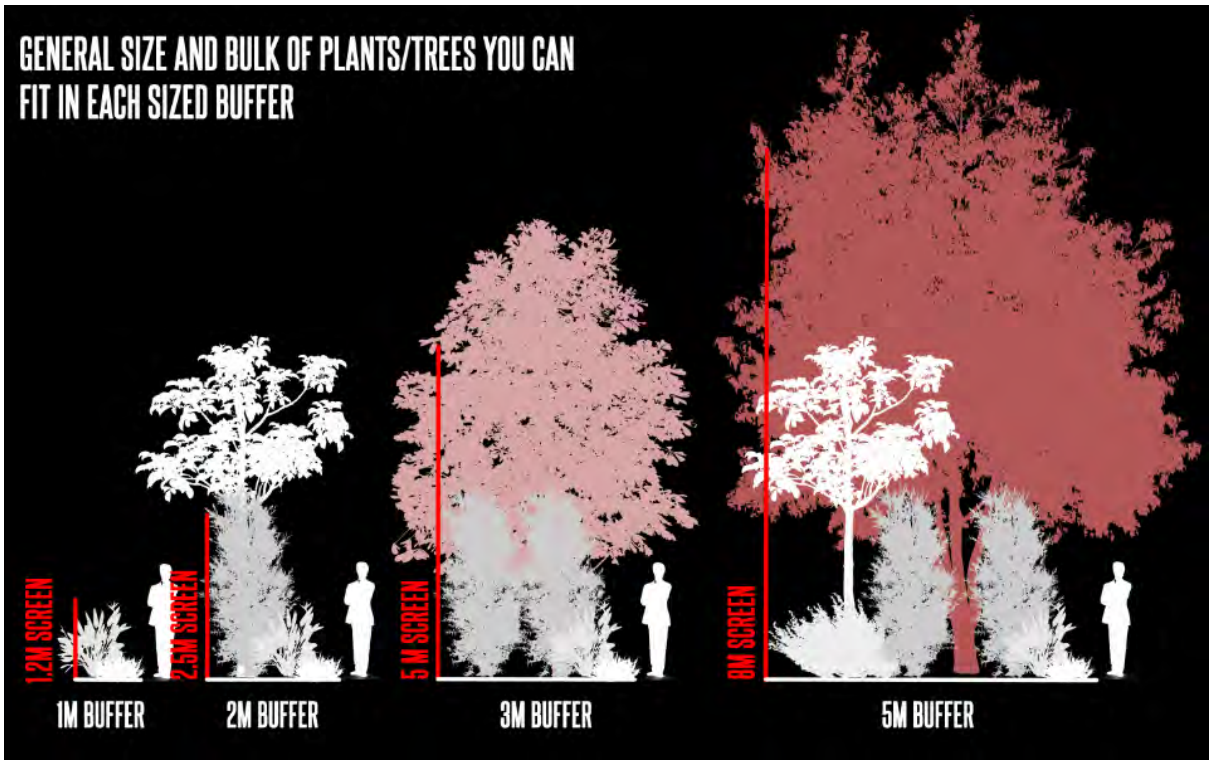


Figure 7: Approximate size and bulk of vegetation buffers

Table 8 provides guidance on landscape buffer widths in relation to adjacent land use. Unless specified differently within the Planning Scheme, a landscape buffer at the widths identified in table 8 below is to be provided as a minimum and maintained along the common boundary.

Location	Buffer Width (m)
Any uses adjacent to the Bruce Highway Road Reserve	10
Industrial uses adjacent to residential uses	10
Centre Uses adjacent to residential uses	3
Industrial uses adjacent to any use other than industrial or residential	3

Table 8: Landscape Buffer Width in Relation to Location

No buildings, other structures, goods storage areas, refuse storage areas, items of plant, loading unloading areas, parking or service vehicle facilities are to encroach upon landscape buffers. For large

landscaped buffers, a mulched or gravel maintenance path should be provided between any fence or structure and the required landscape buffer. Refer to Figure 8 below for guidance.

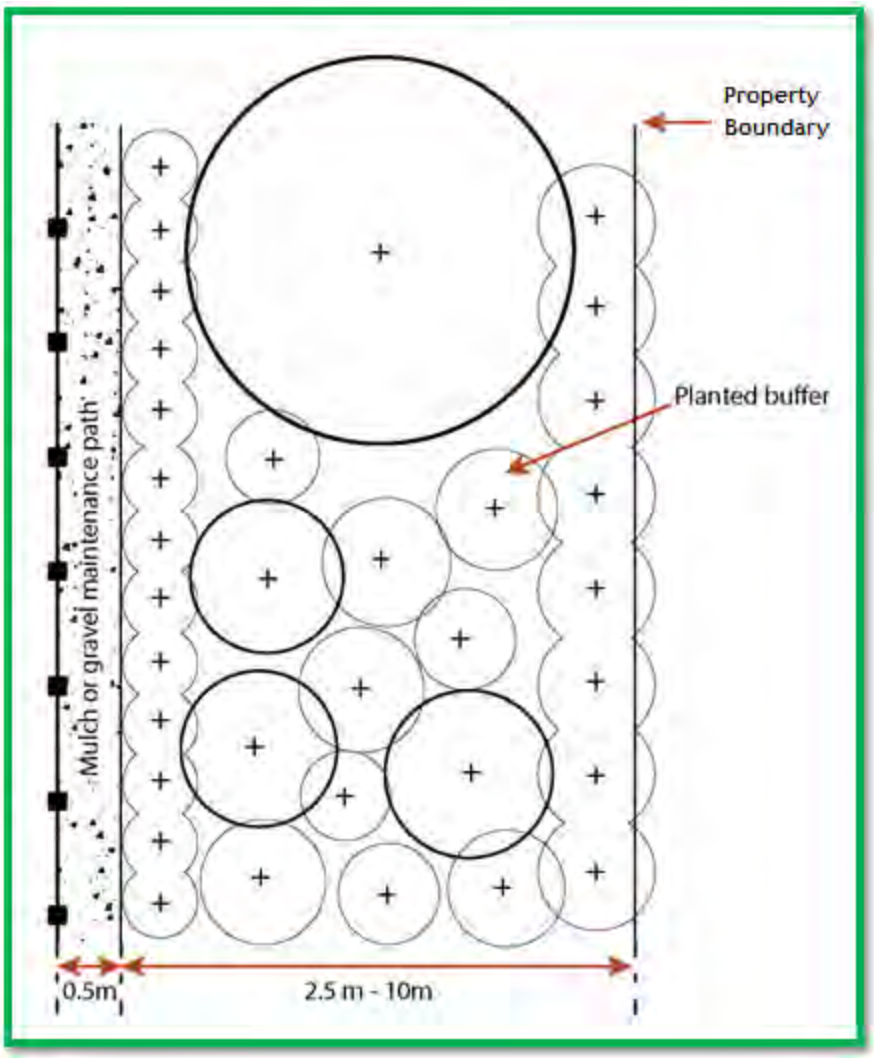


Figure 8: Recommended maintenance corridor for landscape buffers

5.5 Landscaping in mosquito buffer zones

For landscaped areas within close proximity of a known or potential mosquito breeding area, vegetation barriers, such as hedges, are encouraged to be integrated into landscape design to function as an on-ground control option.

Dense vegetative barriers can attract mosquitoes and midges to rest amongst cool, thick foliage that has been pre-sprayed with residual control product.

To enable the vegetation to be used for this purpose, the following specifications need to be considered:

a) the barrier must consist of dense vegetative matter to provide a cool, still, space for insects to land;
b) lower branches must remain on the vegetation - pruning needs to occur so that branching close to the ground is encouraged as many mosquito/midge species fly at 20 - 50 cm height above the ground;
c) low flowering species to be used as product cannot be applied to vegetation in flower;
d) barriers cannot be placed immediately adjacent to water, due to label restrictions of the product, and need a 3m buffer from these areas;
e) leaves cannot have excessively waxy surfaces, or spines as the product needs to stick to the leaves;

f) the resulting barrier is to be maintained to an optimal height of 2-3m and width of 1m by natural growth or pruning;
g) the barriers can be planted on mounds to promote root growth on poorly drained sites;
h) barriers should be continuous with limited breaks and accessible from both sides to facilitate effective spraying. Rows may be offset slightly or overlapping with breaks to prevent excessively long rows;
i) maintenance is essential to create an effective barrier.

It is recommended that a variety of plants be considered for this purpose. This is beneficial because:

a) it makes the landscape more attractive;
b) if one plant in a monoculture is attacked by insect or disease the whole hedge can fail;
c) Recommended species are listed in Table 9 below.

Safety issues have to be addressed with the design of any vegetative barrier. It is recommended that layering of species be employed so as to provide good view lines at critical points (Figures 9 & 10).

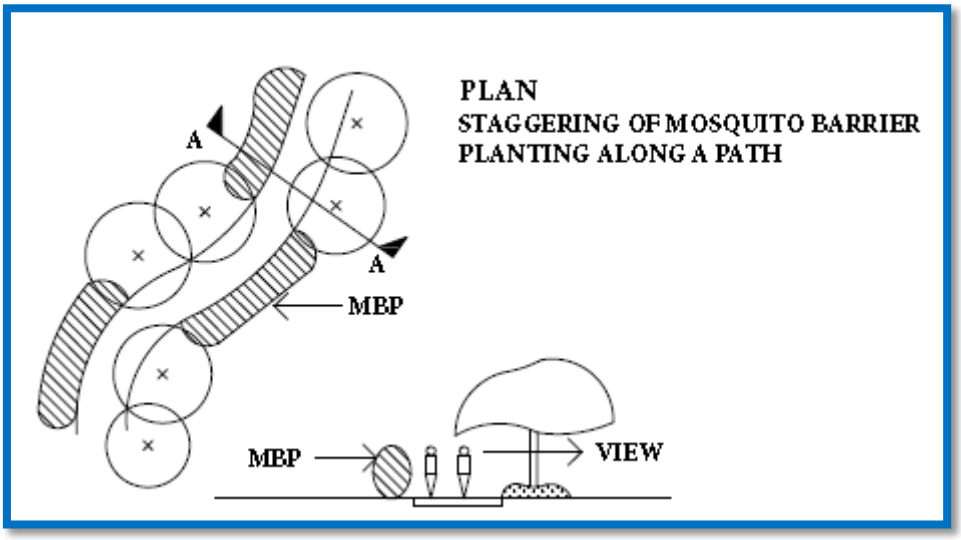


Figure 9 - Examples of mosquito barrier planting (MBP) in a landscaped area.

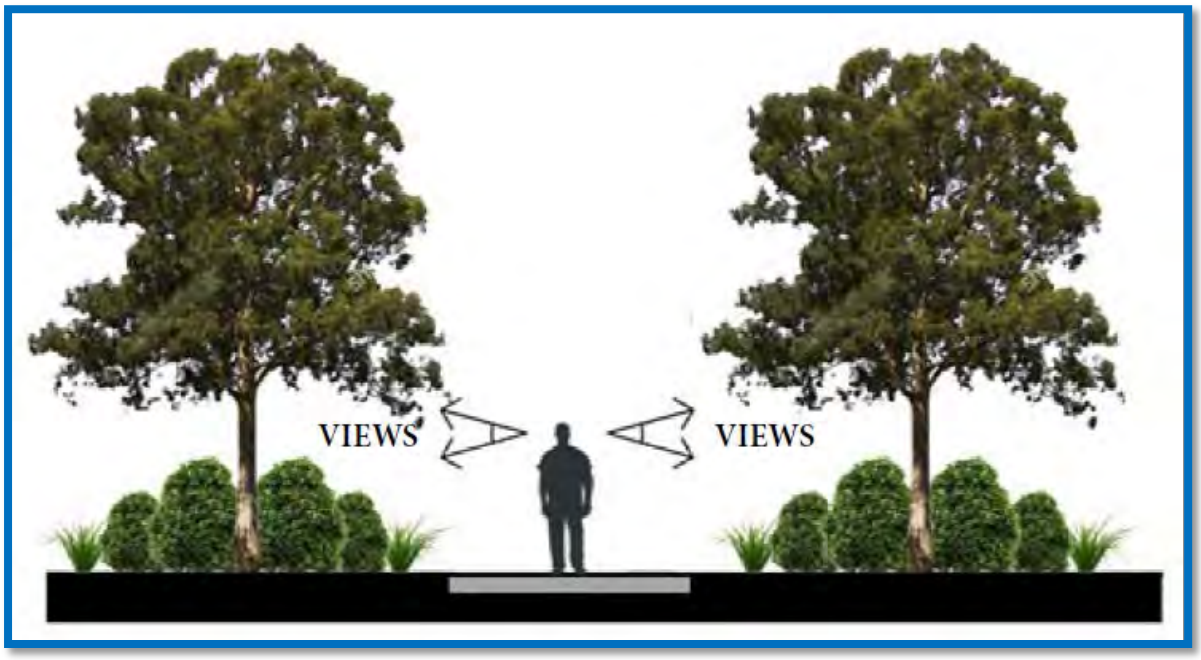


Figure 10 - Examples of mosquito barrier planting (MBP) in a landscaped area.

It is important to consider the context and values of the whole park or open space when designing a planting layout. Where a vegetative barrier is required, it should fit into the whole scheme and not be a dominant element within that scheme.

Potential Mosquito Hedging Plants	
Species	**Approximate dimensions**
Australian Native Species and Cultivars	
Acmena smithii 'Fire Screen'	2-4h x 1.2m w
Acmena smithii 'Forest Flame'	2h x 1m w
Acmena smithii 'Hot Flush'	3h x 1.5m w
Acmena smithii 'Minipilly'	2h x 1.5m w
Syzygium 'Aussie Boomer'	1-2h x 1.2-1.5m w
Syzygium 'Aussie Compact'	2-3.5h x 1.5m w
Syzygium australe 'Express'	4h x 2.5m w
Syzygium 'Resilience'	2-3h x 2m w
Westringia 'Blue Gem'	1-1.5h x .8-1.3m w
Westringia 'Naringa'	2.2h x .1.5m w
Exotic Species	
Metrosideros 'Fiji Fire'	3h x 2m w
Metrosideros 'Little Dugald'	1-2h x 1-2m w
Photinia glabra 'Rubens'	2-3h x 2-3m w
Photinia' Red Robin'	3-4h x 2m w

Table 9 - Recommended species to be used for vegetative barriers

6 Inappropriate Plant Species for General Landscape Use

6.1 General

Many species of plants and trees are not suitable for planting within the Region. These plants are seen as problems because they:

a) listed as prohibited or restricted under the Biosecurity Act 2014;
b) are poisonous;
c) have thorns, spines, or prickles;
d) have invasive root systems;
e) have inappropriate growth habits;
f) are known as potentially invasive environmental weeds;
g) These plants are not to be used in any landscape works on Council owned land.

6.2 Inappropriate species not to be used in the Region

GENUS	SPECIES	COMMON NAME
Abrus	precatorius	Crab's Eye
Acacia	boliviana	Bolivian Wattle
Acacia	farnesiana	Mimosa Bush
Acacia	macradenia	Zig-zag wattle
Acanthocereus	tetragonus	Sword Pear
Acetosa	sagittata	Rambling Dock
Acokanthera	oblongifolia	Wintersweet
Adenophora	riparia	Mistflower
Ageratina	adenophora, riparia	Crofton Weed
Ageratum	houstonianum	Blue Billygoat Weed
Ailanthus	altissima	Tree Of Heaven
Alisma	lanceolatum	Alisma
Allamanda	species	Yellow Allamanda
Alocasia	brisbanensis	Cunjevoi
Alternanthera	dentata	Ruby Leaf
Alternanthera	pungens	Khaki Weed
Amaranthus	spinosus	Needle Burr
Ambrosia	psilostachya	Perennial Ragweed
Andropogon	virginicus	Whisky Grass
Araujia	sericifera	Mothvine
Archontophoenix	alexandrae	Alexandra Palm
Arecastrum	romanzoffianum	Cocos (Queen) Palm
Argamone	ochroleuca	Prickly Poppy
Arundo	donax	Giant Reed
Asclepias	curassavica	Red Cotton Bush
Asparagus	africanas, plumosus	Asparagus Ferns
Aster	subulatus	Wild Aster

GENUS	SPECIES	COMMON NAME
Austroeupatorium	species	Austroeupatorium
Baccharis	cordifolia	Romerillo (Toxic Groundsel)
Barleria	repens	Coral Creeper
Bauhinia	variegata	Bauhinia
Bidens	pilosa	Cobbler's Pegs
Bougainvillea	glabra	Paper Flower
Bougainvillea	spectabilis	Great bougainvillea
Brachiaria	decumbens	Signal Grass
Brachiaria	mutica	Para Grass
Brugmansia	candida	Angel's Trumpet
Buddleja	madagascariensis	Buddleja
Cactus	species	Cacti
Caesalpinia	decapetala	Thorny Poinciana
Caesalpinia	ferrea	Leopard Tree
Cakile	edentula	American Sea Rocket
Callisia	fragrans	Purple Succulent
Calophyllum	inophyllum	Beauty Leaf
Canna	indica	Canna
Carpobrotus	aequilaterus	Angled Pigface
Carthamus	lanatus	Safron Thistle
Cassia	floribunda, obtusifolia	Smooth Senna
Cassia	pendula	Easter Cassia
Cassia	javanica	Apple Blossom Tree
Catharanthus	roseus	Pink Periwinkle
Cenchrus	ciliaris	Buffel Grass
Cenchrus	echinatus	Mossman River Grass
Cestrum	species	Cestrum
Chamaecrista	rotundifolia	Round Leaf Cassia
Chamaedorea	atrovirens	Mexican Parlor Palm
Chloris	gayana	Rhodes Grass
Coffea	arabica	Coffee Bush
Colocasia	esculenta	Taro
Commelina	benghalensis	Wandering Jew
Conium	maculatum	Hemlock
Conyza	bonariensis	Flax-Leaf Fleabane
Conyza	canadensis	Canadian Fleabane
Conyza	sumatrensis	Tall Fleabane
Coreopsis	lanceolata	Coreopsis
Cortaderia	selloana	Pampas Grass
Corymbia	torelliana	Cadaghi
Cosmos	bipannatus	Cosmos

GENUS	SPECIES	COMMON NAME
Cotoneaster	pannosus	Cotoneaster
Crocosmia	crocosmifolia	Montbretia
Crotalaria	pallida	Rattlepod
Cuscata	species	Dodder
Cycas	species	Cycas
Cyperus	aromaticus, brevifolious, involucratus	Navua Sedge, African Sedge
Datura	ferox, metelodies, taulua, stramonium	Thornapples
Delonix	regia	Poincianna
Dendrocnide	excelsa, moroides, photinophylla	Stinging Trees
Desmodium	intortum, uncinatum	Desmodium
Dieffenbachia	species	Dumb Cane
Digitaria	eriantha	Pangola Grass
Diospyros	kaki	Persimmon
Duranta	erecta/ repens	Duranta
Echinochloa	collona, crus-galli	Barnyard Grass
Egeria	densa	Dense Waterweed
Eleusine	indica	Crowsfoot Grass
Elodea	canadensis	Elodea
Emex	australis	Spiny Emex
Eragrostis	curvula	African Love Grass
Erigeron	karvinskianus	Seaside Daisy
Eriobotrya	japonica	Loquat
Eriocereus	species	Harrisia Cactus
Erythrina	crista-galli	Coral Tree
Eugenia	uniflora	Brazillian Cherry
Euonymus	japonica	Spindle Tree
Euphorbia	cyathaphopra, heterophylla	Milkweed
Ficus	elastica	Indian Rubber Tree
Furcraea	foetida, selloa	Hemp
Gloriosa	superba	Glory Lily
Gomphocarpus	physocarpus	Balloon Cotton Bush
Heteranthera	reniformis	Kidneyleaf mudplantain
Hiptage	benghalensis	Hiptage
Hydrocleys	nymphoids	Water Poppy
Hydrocotyle	ranunculoides	Hydrocotyle
Hypochoeris	radicata	Flat Weed
Hypoestes	phyllostachya, sanguinolenta	Polka Dot Plant
Impatiens	hawkeri	New Guinea Impatiens
Impatiens	walleriana	Balsam
Ipomoea	indica, cairica	Morning Glory
Isolepis	prolifera	Isolepis

GENUS	SPECIES	COMMON NAME
Jacaranda	mimosifolia	Jacaranda
Jagera	pseudorhus	Foambark
Juncus	acutus	Spiny Rush
Juncus	articulatus	Jointed Rush
Justicia	betonica	Squirreltail
Koelreuteria	species	Golden Rain Tree
Leonotis	nepetifolia	Klip Dagga/Lion's Tail
Leucaena	leucocephala	Leucaena
Lilium	formosanum	Formosan Lily
Lonicera	japonica	Japanese Honeysuckle
Lonicera	nitida	Boxleaf Honeysuckle
Macroptilium	atropurpureum	Siratro
Macrotyloma	axillare	Perennial Horse Gram
Macrozamia	species	Zamia Palms
Malus	Species	Malus, Crab Apple
Melia	azederach	White Cedar
Melinis	minutiflora, repens	Molasses Grass
Mimosa	invisa, pigra, pudica	Sensitive Plant
Montana	hibiscifolia	Anzac Flower
Morus	alba	Mulberry
Murraya	exotica, paniculata	Murraya, Mock Orange
Myriophyllum	aquaticum, spicatum	Watermilfoil
Nandina	domestica	Heavenly Bamboo
Nasturtium	officinale	Water Cress
Nelumbo	Species	Water Lotus
Neonotonia	wightii	Glycine
Nephrolepis	cordifolia	Fishbone Fern
Nerium	oleander	Oleander
Nymphaea	caerulea subsp. zanzibarensis	Cape Blue Waterlily
Nymphaea	mexicana	Yellow Waterlily
Ochna	serrulata	Ochna
Oenothera	drummondi	Evening Primrose
Olea	africana, europaea	Olive
Panicum	maximum	Guinea Grass, Green Panic
Paspalum	conjugatum, dilatatum, mandiocanum, notatum	Paspalum Grass
Passiflora	foetida, suberosa, subpeltata, edulis	Passion Vine
Paulownia	tomentosa	Paulownia
Peltophorum	pterocarpum	Yellow Poinciana
Pennisetum	alopecuroides	Swamp Foxtail
Pennisetum	purpureum	Elephant Grass

GENUS	SPECIES	COMMON NAME
Phyla	canescens	Condamine Couch
Phyllostachys	aurea	Running Bamboo
Phytolacca	dioica, octandra	Inkweed
Pinus	carribaea, elliottii, patula, radiata	Pine Trees
Polygala	virgata	Polygala
Polypogon	monspeliensis	Annual Beardgrass
Pontederia	cordata, rotundifolia	Pickerel Weed
Praxelis	clematidea	Praxelis
Prunus	munsoniana	Wild Goose Plum
Psidium	guajava, guineense	Guava
Pyrostegia	venusta	Flame Vine
Radermacheria	species	Asian Bell Tree
Rhaphiolepsis	indica	Indian Hawthorn
Rhoeo	discolor	Moses in the Cradle
Ricinus	communis	Castor Oil Plant
Rivina	humilis	Baby Pepper
Rubus	bellobatus, discolor, ellipticus, fruticosus, ulmifolius	Blackberry
Ruellia	malacosperma	Ruellia
Rumex	crispus	Curled Dock
Ruppia	maritima	Sea Tassel
Russelia	equisetiformis	Firecracker Plant, Coral Plant
Sagittaria	graminea, platyphylla, pygmaea	Arrowhead
Salvia	coccinea	Red Salvia
Sambucus	canadensis, nigra	Elder Berry
Sansevieria	trifasciata	Sansevieria
Sasa	species	Dwarf Bamboo
Schefflera	actinophylla	Umbrella Tree
Senecio	mikanioides, tamoides	Ivy
Setaria	palmifolia	Palm Leaf Setaria
Setaria	sphacelata	African Pigeon Grass
Sida	cordifolia	Flannel Weed
Sida	rhombifolia	Common Sida
Sigesbeckia	orientalis	Indian Weed
Solandra	maxima	Chalice Vine
Solanum	erianthum	Tobacco Bush
Solanum	hispidum, torvum	Devil's Fig
Solanum	mauritianum	Wild Tobacco
Solanum	seaforthianum	Brazilian Nightshade
Solidago	altissima	Golden Rod
Solidago	canadensis var. scabra	Canadian Goldenrod

GENUS	SPECIES	COMMON NAME
Sorghum	halepense	Johnson Grass
Stylosanthes	scabra	Shrubby Stylo
Syagrus	romanzoffiana	Queen Palm
Synadenium	grantii	African Milkbush
Tagetes	minuta	Stinking Roger
Tecoma	capensis	Cape Honeysuckle
Tecomeria	capensis	Fire Flower
Tephrosia	glomulifera	Pink Tephrosia
Themeda	quadrivalvis	Grader Grass
Thevetia	peruviana	Yellow Oleander
Thunbergia	alata	Black-Eyed Susan
Tipuana	tipu	Tipuana
Tithonia	diversifolia	Japanese Sunflower
Tithonia	rotundifolia	Mexican Sunflower
Tradescantia	albiflora, zebrine, fluminensis	Wandering Jew
Tradescantia	pallida	Purple Heart
Triumfetta	rhomboidea, semitriloba	Sacramento Burr
Tropeolum	species	Nasturtium
Urtica	dioica	Stinging Nettle
Verbena	tenuisecta	Mayne's Pest
Verbesina	enceliodes	Crownbeard
Watsonia	meriana var. bulbillifera	Bulbil Watsonia
Xanthium	pungens	Noogoora Burr
Xanthium	spinosum	Bathurst Burr
Xanthosoma	violaceum	Blue Taro
Zanthedeschia	aethiopica	Arum Lily
Zebrina	pendula	Wandering Jew
Zephyranthes	grandiflora	Pink Storm Lily
Zinnia	peruviana	Wild Zinnia

Integrated Design - Appendix E
Design Checklist Template

For State Approval - Major Amendment 1 - December 2017

Design for the User Checklist

Location……

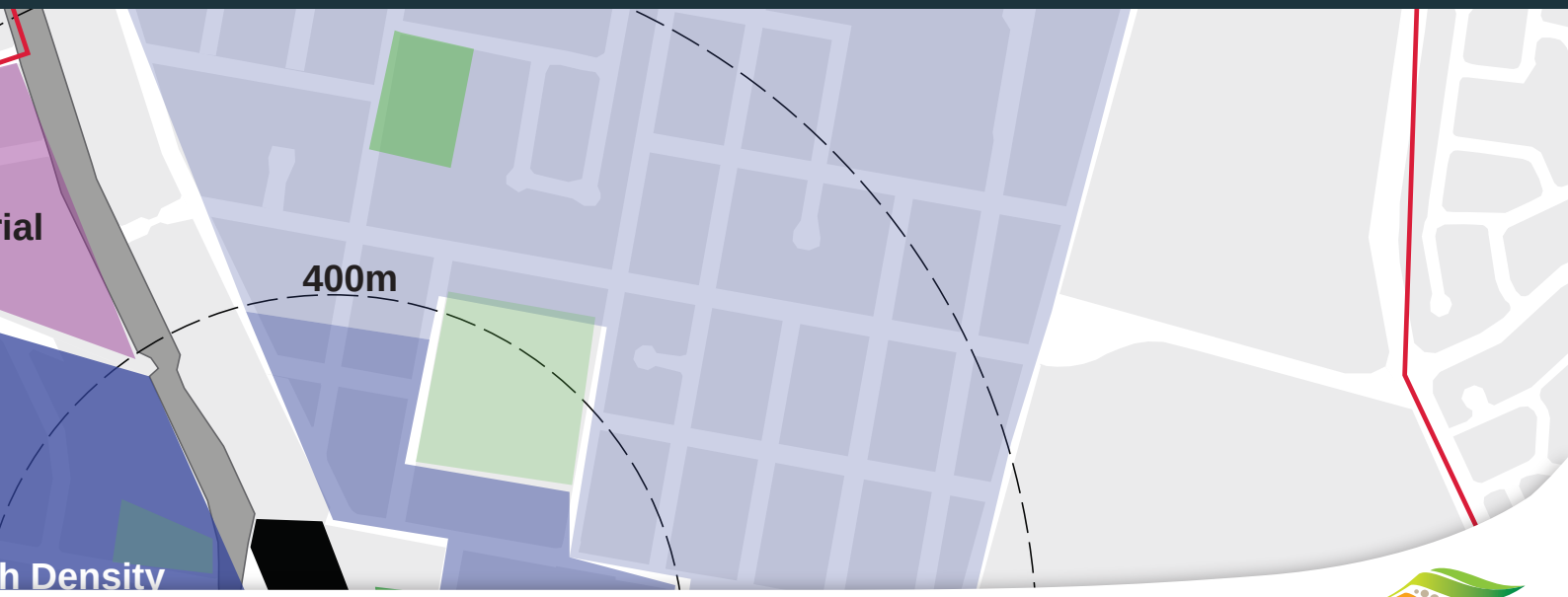
The following checklist has been prepared to ensure that all development encourage and support the goals and principles of the Integrated design guideline. The checklist items should be considered to help fulfil each goal and its supporting principles.

Goal	Principles	Item	Description	Comment	Check
Safe Places	A. Enhance the safety of all street users through a legible and distinct multi-modal network. B. Priorities the movements of vulnerable users (children, elderly and those with disabilities) and modes (pedestrian and cyclist) in a safe and balanced manner. C. Activate streets and public places as a communal space that is appreciated and inspires pride in place. D. Promote the use of Crime Prevention Through Environmental Design (CPTED) Principles in street and public place design.	• Inclusive design that provides for: o People on foot o People on bicycles o Public Transport Users • User safety and comfort • Ownership • Respectful route choice	• Priority road crossings e.g. Zebra Crossings, pedestrian refuges • Appropriate width pathways • Shade Trees • Seating • Legibility • Removal of hazards, obstructions and clutter • Bicycle lanes • End of trip facilities • Bus shelters • Information • Surveillance • Lighting		
Distinctive Places	A. Designs streets and public places as destinations of choice rather than purely infrastructure necessities. B. Create a definable image that celebrates the role that streets and public places play in producing vital and unique environments C. Explore and enhance the distinctive qualities of our region through thoughtful designs that are respectful of adjoining land uses, the environment and community. D. Design streets and public places as a visual experience that provides stimuli for all users.	• Diversity of functions • Relationship to its context • Definable character • Multi-purposing of infrastructure • Simulation of users	• Landscape and streetscape treatments to create character • Different pavement texture and colour • Public art • Views and vistas • Micro climates and topography • Design massing and scale • Relationship to adjoining environments.		
Liveable Places	A. Create streets and public places primarily for people through designs that actively provide opportunities for social and economic exchange. B. Design streets and public places to positively contribute to a strong relationship between buildings and spaces that frame them. C. Enhance the overall quality and amenity of streets and public places through the provision of shade trees, view/ vistas and public art. D. Create streets and public places that inspire an active and health lifestyle through the provision of safe and connected networks.	• Respectful of local conditions • Socially conscious • Climate responsive	• Shade Tree Planting • Local plant species • Cater for a variety of actives and uses • Street furniture and public art • Human scaling • Fit for intended purpose and users • Solar orientation		
Connected & Accessible Places	A. Create logical, connected, permeable, easily understood and well organised networks of street and public places that avoid the use of cul-de-sacs and fragmented intersections. B. Maximise transportation choice by providing a totally connected pedestrian and cyclist network.	• Integrated and resilient network connections • Intersection type and spacing • Cul De Sac • Universal access standards • Priorities user functions	• Improved permeability, connectivity and activation • 4 way intersections to increased connectivity • Limited modal filtering • 400 and 800m catchments		

	C. Design streets and public places that contribute to a distinctive structure. D. Promote the use of universal design standards to create a clear, connected and unobstructed network for people of all needs.	• Infrastructure design as wayfinding	• Grid Structure • Removal of Cul de Sacs • Design to cater for desire lines • Design for all users and abilities • Context specific infrastructure designs		
Responsive & Sustainable Places	A. Respect and respond to the natural and built environment through design that positively contributes to the structure of a place. B. Design adaptable streets and public places that are able to accommodate future evolutions in their form and function. C. Promote the individualisation of streets and public places to reinforce the character, micro-climate and context of their surrounds. D. Integrate environmental stewardship through the incorporation of water sensitive design, climate responsive design and the preservation of native flora and fauna.	• Integration of Design Elements • Incorporation of Green Infrastructure (including WSUD and street trees) • Future proofed designing • Whole of life costs	• Integrated elements to provide both form and function? • MBRC 's 9 Place Values • Incorporate WSUD within the street or park (at source) • Ensure WSUD does not compromise desire lines for movement • Incorporate shade tree planting within the WSUD treatment • Fauna sensitive design solutions • Natural elements to structure the environment • Adaptable infrastructure to meet changing circumstances • Financially responsible through design, building and maintenance lifecycle		

Integrated Design - Appendix F
Access & Urban Design Statement Template

For State Approval - Major Amendment 1 - December 2017



Access and Urban Design Statement Template

The following principles should be explained and illustrated as part of the Access and Urban Design Statement submitted to council.

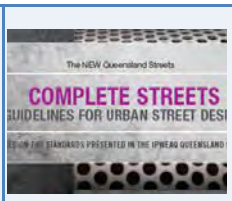
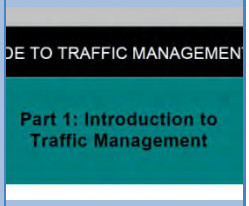
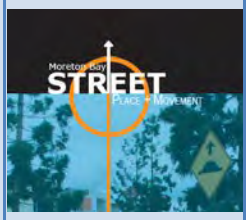
1	ACCESS AND MOVEMENT
1.1	Is the level of design for transport users consistent with its Place Type and zone?
1.2	How is the development structured? Is it connected internally and externally for all transport users? How have identified movement barriers been resolved through site design? Does the design contribute to a distinctive and legible internal and external structure?
1.3	Has any priority been given to a particular transport user? What access facilities have been designed for the varying needs of transport users?: • Pedestrians • Cyclists • Public Transport • Service Vehicles (deliveries and pick-ups) • Private Car
1.4	Has the access and movement requirements designed to balance the function needs of the network and the form needs of its built environment?
1.5	Have access and movement patterns and desire lines to and from adjoining sites been considered? How have they been included and embellished as part of the site's design? How does the proposed development integrate with the existing streetscape?
1.6	Have intersection and road capacity improvements been considered and to what design year?
1.7	Has public transport, service vehicles and emergency vehicles access and maneuverability requirements been considered?
1.8	Has there been any consultation with public transport service providers?
2	**CHARACTER AND PLACEMAKING**
2.1	Does the design respect and build upon the existing character? Is a definable character created that celebrates the role that streets and public places play in producing vital and unique places?
2.2	Have street trees been included to promote shady streets and visual character? Are they respectful of the climatic conditions?
2.3	Have streetscape elements been included such as landscaping, texture, street furniture and public art? Have they been placed with respect of users' desire lines? Are they respectful of their surrounding environments? Do they contribute to the creation of a quality place?
2.4	Are site specific landscaping and street furniture elements used or are they standard materials?
2.5	Has the relationship between public and private space been considered? Is the relationship managed and definable?
2.6	Is the development legible to aid way finding? Are there elements that help to navigate the development?
2.7	Are entrances celebrated or threshold treatments used to distinguish to entry points?

3	COMMUNITY SAFETY
3.1	Are the movements of vulnerable users (children, elderly and those with disabilities) and modes (pedestrian and cyclist) catered for in a safe and balanced manner? Is the use of universal design standards utilised to create a clear, connected and unobstructed network for people of all needs?
3.2	Are users protected from adverse climatic conditions through built or natural elements (awnings and trees)?
3.3	Have potential noise internal and external sources been considered and eliminated during the design process?
3.4	Has Crime Prevention Through Environmental Design (CPTED) principles, been adopted in the design process? Has casual surveillance been between private and public space been incorporated in the design?
4	**ENVIRONMENTAL SUSTAINABILITY**
4.1	Have matters of environmental significance been considered in the design process?
4.2	Have green corridors been protected and enhanced? Does landscaping respect its regional ecosystem?
4.3	Have opportunities for fauna sensitive road design been explored and included where site conditions permit?
4.4	Have opportunities for Water Sensitive Urban Design been explored and included where site conditions permit?

Integrated Design - Appendix G
Recommended Best Design Practice Guidelines

For State Approval - Major Amendment 1 - December 2017

Recommended Best Design Practice Guidelines

1	**Streets and Roads other than Arterial or Sub Arterial**	• **Appendix A – Streets, Roads & Utilities** • **Queensland Complete Streets** http://www.engicom.com.au/products/complete-streets**includes roads that have street functions** • **Austroads Design Guides** http://www.austroads.com.au/ National standard design guidelines for transport infrastructure	
2	**Roads (Arterial and Sub-Arterial) and technical guidance**	• **Appendix A – Streets, Roads & Utilities;** • **Austroads Design Guides** http://www.austroads.com.au/ National standard design guidelines for transport infrastructure	
3	**MBRC Urban Design Guidelines**	• **Planning Scheme Policy - Neighbourhood Design.** • **MBRC Street, Place and Movement** http://www.moretonbay.qld.gov.au/general.aspx?id=91513 provides details of form, function and characteristics of good public space design.	
4	**Transport and Traffic**	• **Planning Scheme Policy - Integrated Transport Assessment** • **DTMR Planning for Safe Transport Infrastructure at Schools** • **DTMR Traffic and Road Use** • **management Manual (TRUM)** • **DTMR Manual of Uniform Traffic Control Devices (MUTCD)** • **Austroads Design Guides** http://www.austroads.com.au/ National standard design guidelines for transport infrastructure	
7	**Neighbourhood Planning and Design**	• **MBRC Planning Scheme Policy – Neighbourhood Design**	
8	**Detailed Design Standard Drawings**	• A full list of Council's standard drawings is listed in **Appendix H – Standard Drawings**	

9	**Road Pavement Design**	• Road and Street Pavement Design standards are located in **Appendix A – Streets, Roads and Utilities** • **Austroads Design Guides** http://www.austroads.com.au/ National standard design guidelines for transport infrastructure	
10	**Open Space**	• MBRC Open Space and Park Design Guidelines are located in **Appendix B – Open & Civic Space Design**	
12	**Lighting**	• **Appendix A – Streets, Roads & Utilities;** • **Australian Standard AS1158 (Street Lighting)**	
13	**Water and Wastewater**	• **SEQ Water Distribution Standards**	
14	**Parking**	• **Australian Standard AS2890 - Parking Facilities (Parts 1 to 6)**	
15	**Cycling Facilities**	• **Appendix A – Streets, Roads & Utilities;** • **Appendix H – Standard Drawings** • **Austroads Design Guides** http://www.austroads.com.au/ National standard design guidelines for transport infrastructure	
16	**Earthworks**	• **Australian Standard AS3798** -Guidelines on Earthworks for Commercial and Residential Developments	
17	**Bridges and Structures**	• **Aus-Spec D03-S4** • **AS1170 – Structural Design Actions** • **AS 5100 – Bridge Design** • **AS3600 – Concrete Structures** • **AS4100 – Steel Structures** • **AS/NZS3845 – Road Barrier Safety Systems**	
18	**All Stormwater management and design considerations**	• For all matters regarding stormwater management and design refer to **Appendix C – Stormwater.**	
19	**Data Management**	• **Data Capture Guideline 2010** • **Asset Management Guideline 2010** • **Planning Scheme Policy - Operational works inspection, maintenance and bonding procedures**	
20	**Erosion and Sediment Control**	**International Guidelines for Erosion and Sediment Control**	

Integrated Design - Appendix H
Standard Drawings

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To view a complete and up to date version of all standard drawing listed below, please refer to the MBRC Standard Drawings webpage at – www.moretonbay.qld.gov.au/standard-drawings

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GI-0540	Fauna Crossing Underpass - Sheet 1 of 2
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GI-0560	Fauna Crossing - Rope Cage And Rope Ladder Typical Details - Sheet 1 Of 2
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Planning Scheme Policy
Integrated Transport Assessment

For State Approval - Major Amendment 1 - December 2017

Table of amendments

Date of adoption and effective date	Planning scheme policy version number	Amendment type	Summary of amendments

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Planning scheme policy - Integrated transport assessment

Adoption

MBRC adopted this planning scheme policy on 24 November 2015.

Commencement

This planning scheme policy will take effect from 1 February 2016. Amendments to this planning scheme are included at **Table of Amendments** (inside front cover).

1. Introduction

This policy supports the Moreton Bay Regional Council Planning Scheme and has been made by Council in accordance with Chapter 3, Part 4, Division 2 and Part 5, Division 1 of the *Sustainable Planning Act 2009*.

The MBRC Planning Scheme Strategic Framework which is intended to guide development within the MBRC area emphasises the importance of place making and urban design to create quality human habitats. This is particularly important as the planning scheme seeks to accommodate more people and jobs within existing and new urban areas, protect green networks, avoid flood hazards, provide for movement within and between places, and to improve the integration and coordination of land use planning and infrastructure delivery.

This planning scheme policy sets out the process and content required for an Integrated Transport Assessment (ITA) and provides more general guidance for transport integration for developments not requiring the preparation of an ITA.

The design attributes of development proposals can influence the availability of transport choices. Developments need to support walking and cycling, increasing the mode share of active and public transport, and provide adequately for servicing. They also need to address the transport impacts of a development on the existing and future transport network. New developments will be planned, designed and delivered to support more travel choices.

The ITA is intended to:

a) demonstrate that new development is well considered in terms of all transport modes;
b) be consistent with the outcomes of Planning Scheme Policy- Integrated Design;
c) ensure the right type of activity is occurring in the right place or precinct and does not unduly compromise the planning and operation of the transport network;
d) precede and guide development applications to support the availability of transport choices;
e) address the transport impacts of a development from construction until 10 years after completion of the last stage of the development.

1.1 Purpose

The purpose of this policy is to:

a) Provide a guide to new developments to support access and movement by a variety of transport options, by:
   i. provision of specific measures to support and encourage walking, cycling and greater use of public transport
   ii. adopting design principles to support an integrated overall urban structure within the local area
   iii. supporting and reinforcing the desired access hierarchy in the order of pedestrian, cycle, public transport, emergency access, servicing and general traffic
   iv. integrating and connecting with surrounding development, land uses and transport networks
   v. providing high quality pedestrian, cycle and vehicle networks both within the development and connected to the surrounding area;
   vi. providing safe crossings for pedestrians and cyclists

vii. accommodate desire lines of travel for wildlife.

b) Provide guidance to the information required when submitting development applications.
c) Provide guidance on the preparation of an ITA, where required by the planning scheme.

1.2 Application

This policy applies to:

a) A material change of use
b) A preliminary approval overriding a planning scheme
c) Reconfiguring a Lot
d) A Structure Plan prepared using the PSP- How to prepare a structure plan

And:

a) An area or activity identified in the planning scheme as requiring preparation of an ITA preceding consideration of a development application.
b) An area identified by resolution of Council from time to time as requiring preparation of an ITA preceding consideration of a development application
c) Development where traffic to or from the development at any time within the next 10 years is forecast to increase the two way flow on the adjoining road or intersection by more than 5% in the morning or afternoon transport peak
d) Development within 200 metres of a transport sensitive location such as a school, shopping centre, bus or train station or a large generator of pedestrian or vehicular traffic
e) Development which has access onto a sub-arterial or arterial road or within 100m of a signalised intersection
f) Development which dissects or significantly impacts on an environmental area or an environmental corridor
g) Development greater than the thresholds identified within Table 1 – Activity Thresholds for Integrated Transport Assessments:

Table 1 - Activity Thresholds for Integrated Transport Assessments

Land use	Threshold
Residential	More than 50 lots or dwellings
Offices	More than 4,000m^2
Retail activities including hardware and trade supplies, shop, shopping centre, showroom	More than 1,000m^2
Warehouse and Industry– including high impact, medium impact, low impact and special industry.	More than 6,000m^2
On site car parking	More than 100 spaces
Trip generation rate	100 vehicles within the peak hour for the activity

Applications for development, including temporary use and/or interim development in an area identified as requiring an ITA will not be supported until there is an approved ITA prepared in accordance with this policy.

Nothing contained in this policy shall preclude Council and the Applicant from entering into an agreement with regard to the matters dealt with by this policy.

Where an ITA has been prepared by Council and the proposed development application has been prepared in accordance with the assessment prepared by Council then the requirements of this policy are deemed to be complied with.

2. Functional transport network

The Moreton Bay Region has now moved to a functional transport network. Roads and streets in different places will have different roles and priorities in terms of the transport modes and movement. The ITA will help ensure that the travel demands of a development and identified solutions to address those demand, reflect the role of the road or street in the particular location.

Guidance should be taken for the future structural road layout in accordance with the functional hierarchy identified within the Planning scheme policies – "Neighbourhood Design", and "Integrated Design".

For example, road with a:

a) Place function – streets that maximise the ease and attractiveness for pedestrian, active transport and public transport users and supports the place activity while providing access to and from the place
b) Movement function – roads that maintain good access to, from and between centres, economic areas and motorways, while active transport users are provided safe facilities.

The preferred transport options will address the travel demands of a development in the following priority order:

a) Reducing the need to travel
b) Maximising access by walking, cycling and public transport
c) Identifying measures to accommodation residual trips

The road and street network will be designed to support greater transport movement options through the use of:

d) Grid structures to maximise walkability
e) Four way intersections to increase legibility and reduce speeds
f) Connections with the existing street network to integrated development with surrounding uses
g) Integration with other infrastructure networks including open spaces and community facilities.

3. Preparation

The matters outlined in Access and Urban Design Statement identified within the PSP – Integrated Design and this document (where it exceeds the thresholds identified within Table 1) are to be considered at the conceptual stages of a development proposal.

Early and ongoing involvement of a suitable expert, such as a transport planner, will enable transport matters to be considered and addressed at the conceptual stage of a proposal. An ITA submitted to support a development application must be impartial, objective and concise, addressing those matters identified.

The key assumptions included within the ITA should be confirmed by Council as being acceptable prior to lodgement of the ITA and the development application. This will assist in timely consideration of the information, and reduce the need for additional work if the assessment is based on approaches not considered acceptable to Council. The assumptions that should be confirmed with Council include (but are not limited to):

h) Trip generation rates
i) Mode Share
j) Trip Distribution
a) Requirements for intersection capacity analysis or other traffic modelling

4. Further advice

Where proposals impact on roads that are controlled by Council, consultation with relevant Council transport planning officers is recommended.

However, when a proposal involves a State controlled road and/ or the rail network, the Department of Transport and Main Roads and Queensland Rail will need to be consulted.

5. Interpretation

Terms used in this planning scheme policy are defined in Schedule 1 – Definitions of the planning scheme. Where a term is not defined in Schedule 1, section 1.3 Interpretation of the planning scheme applies.

6. Matters to consider

The preparation of an ITA must demonstrate that it is consistent with the principles contained within the integrated infrastructure strategies for the region. The integrated infrastructure strategies include: Integrated Transport Strategy, Travel Demand Management Strategy, Active Transport Strategy, Networks and Corridors Strategy, Public Transport Strategy, Freight Strategy, and any relevant additional transport strategies.

An ITA prepared in accordance with Attachment 1 Guideline for an Integrated Transport Assessment is considered to address and be consistent with the principles contained within the integrated infrastructure strategies. The following outlines the principles contained within Moreton Bay Regional Council transport strategies.

6.1 Travel Demand Management Strategy - Managing our demand for travel

a) Reducing the need to travel – Less travel can be achieved through shorter and fewer trips. The way our places are laid out influences our need to travel at the site, within the local area, and across the district. If our homes are closer to things we need – we can travel there more easily by walking, cycling and public transport.
b) Better transport options – People want to be able to make a choice as to how and when they travel. They need a variety of routes and means to travel. Available choices need to satisfy different journey purposes. People expect a reasonable level of transport service throughout the urban area.
c) Knowledge of transport choices – Users can choose to change their travel behaviour by being informed of implications of the transport options available to them. Access to information on footpath networks and public transport services can encourage the use of more sustainable transport modes.

6.2 Active Transport Strategy - Planning for active transport

a) Active communities – Many places are important destinations for walking and cycling. These include mixed use activity centres, public transport stations, schools and employment nodes. It is important that we establish better walking and cycling connections to and within these places. This connectivity and high level of amenity will make these locations more accessible, lively and enjoyable.
b) Connecting across the region – Moreton Bay region covers over 2,000 square kilometres, including a variety of rural and urban communities. Walking and cycling links between communities will offer greater travel choice.
c) Building an active transport culture – Changing attitudes to walking and cycling is important. Promoting active transport will make walking and cycling a preferred choice for more people.

6.3 Public Transport Strategy - Planning for public transport

a) Timely and reliable public transport – Journey times need to be consistent and comparable to other transport options. Users expect a balance between availability, journey time, cost, coverage and frequency.
b) Accessible and affordable public transport – All users should find public transport easy, attractive, comfortable and affordable to use without being limited by physical or financial capacity
c) Clear and useful public transport information – Users and potential users of public transport need the right information before and during a journey. Information must be available to give users confidence in getting to where they want to go, when they want to go.

6.4 Freight Strategy - Planning for the movement of goods and services

a) Freight awareness – developing greater understanding of the role and significance of freight within our places by educating industry and the community
b) Accommodating freight movement - identifying and improving suitable routes to meet user needs. This includes design and integration of freight facilities to provide for delivery while reducing the impact on communities
c) Optimising the movement of freight – considering better ways and modes to move and exchange freight.

6.5 Transport Network and Corridors Strategy - Planning for Transport Networks and corridors

a) Moving between places –The region's network of transport corridors provide for the movement and mobility of people and goods for both local and longer trips. The variety of facilities provides travel choice across all trip purposes. Travel opportunities need to be available to allow users the freedom to choose the most appropriate mode depending on their journey type and purpose.
b) Access to our centres –The sustained growth of our region will see increasing development densities within our activity centres. Providing good access and travel choice to and within these centres will have multiple benefits for the whole region. This will support the principles of transit oriented development, and foster the conditions necessary for economic regeneration and more self-containment of employment within the region.
c) Permeable and connected street network – Communities rely on a network of streets that underpin the structure of a neighbourhood. Permeable and fully connected street networks are an important principle in establishing local transport facilities that support access to destinations. When planned and designed in context with low traffic speeds, legible street networks provide conditions that promote walking and cycling and allow access for buses.

Attachment 1: Guideline for the preparation of an Integrated Transport Assessment

1. Executive summary

Prepare a short synopsis of the proposal, its impacts and the planned mitigation and implementation measures identified through the ITA process.

Advice

The Executive Summary should be short and concise – but detailed enough to be read as a standalone section and provide a reader with enough information to feel familiar with the development and the recommended outcomes without needing to read the full report.

2. Introduction

Prepare a brief outline of proposal and a description of the general location and context of the proposal.

Advice

Keep the description brief, bearing in mind that a fuller description will be provided in a later section under "Proposal" and that a description will also be provided in the development application when the ITA is associated with an application.

For a structure plan or a preliminary approval to override the planning scheme:

Description of the type of zoning and precinct, the transport matters such as road layout proposed, the type of activities proposed and their intensity (e.g. 750 dwellings or 350 employees are planned). Identify any transport issues unique to the proposal.

For site specific proposals:

Describe the site characteristics, the land use proposed and its intensity, and relevant transport matters such as the supply of on-site parking proposed, access arrangements or hours of operation if known.

3. Description of existing land use and transport environment

Set the scene and introduce the location in more detail than in the introduction. Provide a map identifying the existing roads within the vicinity of the site or development area.

Show any places of interest that will be referred to within the body of the ITA. Photos and aerial photographs are particularly helpful in showing the context of the development.

Advice

Identify the features of the existing transport network, including the following items as relevant to the proposal and site:

- *existing walking and cycling networks within convenient walking and cycling distance*
- *existing bus and rail service routes and frequencies within convenient walking and cycling distance*
- *bus stops, bus lanes and high occupancy vehicle (T2 or T3) lanes with potential to serve the site*
- *on-street and off-street parking facilities*
- *road hierarchy of adjoining roads and routes to higher-order roads. This should be consistent with the functional road hierarchy and process for identification contained within the Planning scheme policies – "Neighbourhood Design", and "Integrated Design"*
- *traffic volumes on main routes (which could include turning volumes, level of service (LOS) information, and comparisons between peak and inter-peak time)*
- *crash records*
- *truck and service vehicle access and facilities.*

Highlight any land use characteristics that have a bearing on the proposal, including any known or approved future proposals.

Map this information where possible will present a clearer picture.

4. The proposal

Provide a full description of the proposed development, supporting infrastructure and anticipated use to ensure a full understanding of the development proposal. If the development is proposed to occur in stages, outline those stages and the timeframes involved.

Advice

For a structure plan or a preliminary approval to override the planning scheme

Include information on the proposed change of use; the types of activities that will be permitted in each respective zone and to what intensity those activities will be permitted. This will outline the theoretical maximum development potential of the area (irrespective of whether this may occur in reality).

Outline what type of road network plan is proposed. Guidance on preparing a road network plan is contained in Planning scheme policy – Neighbourhood design

Matters that should be addressed include:

- *What will the road hierarchy and road functional classification within the development area and/or serving the development?*
- *What are the applicable cross sections for the road type(s) as identified within the identified within the Planning scheme policy -Integrated Design.*
- *How have the needs of pedestrians, cyclists, service vehicles and public transport users been provided for within and accessing the development area from its service catchment?*
- *What is the approach to be taken to parking provision within the development area?*

For site specific proposals

The description should detail what type of activity is proposed, what the intensity of the development will be and operating hours if known. Outline access and parking arrangements, appropriate street cross sections (as per Planning scheme policy -Integrated Design), loading provisions (if appropriate) and any pedestrian and end of trip cycle facilities that are proposed.

Describe the site and any existing development that is presently occurring on the site and adjacent to the site. Address what will happen to existing development and how the new development will integrate with existing buildings, existing street cross sections, parking and access points if they are to remain.

5. Integration with future transport network

Provide a short statement referring to wider planning strategies such as the South East Queensland Plan, Strategic Framework (Part 3 of the planning scheme) and the various transport strategies prepared by Council to outline the future direction sought for land use and transport within the Moreton Bay region. This should remain brief.

Advice

Identify how the proposal will fit within existing and future transport networks when considered as one network. It should identify upgrades and improvements in services planned by Department of Transport and Main Roads, TransLink and Council and how these are relevant to the development.

A particularly important component of integration is ensuring that the staging of the development is proposed in line with the predicted completion dates for any particular infrastructure or service upgrade proposed within strategic and infrastructure plans. The ITA should outline the proposed staging of the proposal and demonstrate how this is in line with transport plans for the area.

For a structure plan or a preliminary approval to override the planning scheme

For proposals covering a wide geographical area the ITA will need to demonstrate how the proposal integrates with and supports the future transport network surrounding the development area. With respect to the internal layout of the area the ITA should demonstrate that decisions made about the type of land use and the intensity of land use have been made to support the road layout planned and that the road layout provides a network for all modes of transport.

For site specific proposals

For proposals on a single site or covering a limited geographical area, the ITA should demonstrate that the proposed intensity and type of land use is appropriate with respect to the surrounding transport network, or can be designed so as not to adversely impact on the transport network. The focus of the analysis should be on how the site achieves adequate integration with the surrounding transport network and how the proposed design within the site provides for all transport modes adequately.

Matters to consider:

- *Is the site located adjacent to an existing or planned rail or bus station?*
- *Is the site within a reasonable walking distance of a rail or bus station (1km)? If so, how can pedestrians access the site in terms of direct route and the quality of pedestrian facilities along that route?*
- *Does the site locality achieve high levels of walking and cycling infrastructure by level of service standards identified within the Active Transport Strategy?*
- *How has the development been designed to interact with the transport network so as to facilitate pedestrian and cyclists movements, to encourage public transport use and to manage traffic congestion?*
- *Is a travel plan proposed?*
- *What level of car parking is being provided, and how is access and egress to be managed?*

6. Predicted trip generation and expected mode share

An overview of the origin and destination of users of the development, that is, where they will be coming from and leaving to, with relation to the existing transport network (and any relevant upgrades proposed in transport plans). It should draw conclusions as to what mode shares could reasonably be expected in the circumstances.

Advice

This analysis should address the following matters:

Land use characteristics

Describe the catchment the proposal will serve – local or wider catchment. Will it attract single purpose or multipurpose trips i.e. can other activities be undertake on the site or within proximity of the site. Are these within walking distance and are connections provided? Is the development dependant on car use or can a significant proportion of travel be undertaken by public transport or active transport?

Public transport accessibility

Identify the origins and destinations of people traveling to the development and the availability of public transport services, frequency in relation to core hours of the activity. Identify the accessibility of the development to bus stops within 400 metres of an actual walk catchment or bus or train stations within 1km of an actual walk catchment. The actual walk catchment relates to links and connections available to the public including roads, pathways, laneways and through open space. Consideration of safety and amenity for persons using active transport to and from public transport and adequacy of facilities at the stations is to be included.

Walking and cycling accessibility

The facilities available onsite for walking and cycling, facilities within a walking or cycling distance of the development, and identification of any improvements needed to encourage these modes.

Service and emergency vehicle access

Provide details on how emergency vehicles will access the site, how servicing of the site will be achieved and how this servicing will avoid impacts on active transport.

Private vehicle accessibility

Assess the existing and future private vehicle travel anticipated to be generated by the development, internal circulation and impacts of this on the surrounding road network and intersections. Consideration should be made regarding level of parking provided, mode share, trip generation and distribution and existing conditions within the transport network. Include a road safety audit including consideration of all users, site access, existing crash and injury history, provision for service vehicles etc.

Predicted mode share

Identify the predicted mode share for the development so that appropriate parking is provided (rather than over-supply) and the traffic generation assessed for the development is accurate (rather than over-predicting private vehicle mode shares). Although mode share predictions may be subject to change, it is possible to predict with some degree of confidence how people are likely to travel to an area or an activity by different modes. This allows an understanding to be gained as to measures that can be implemented to influence the mode share of the development and what measures (e.g. infrastructure, education, operation) are proposed to achieve this.

7. Evaluation

Using the information gained in previous sections of the report, assess the impacts of the development on surrounding transport network.

Advice

The evaluation should *include:*

- *conflicts from vehicles accessing and egressing the site including consideration of other transport users including public transport, active transport and other vehicles*
- *differentiate between existing problems with the transport network and those as a result of development*
- *inclusion of strategic and/or localised intersection modelling and the results of this modelling, or the reasons and judgement as to why transport modelling was not considered necessary.*

8. Mitigation and improvements

Identify the necessary mitigation measures that will be required to address any impacts on the transport network. Measures may be proposed as a positive way of increasing the mode shares for public transport, walking and cycling.

Any mitigation must have regard to the existing or proposed road hierarchies. For example if a road adjoining a proposal or development site is noted as being a primary Active Transport route then the needs of active transport users should have increased priority when considered with other modes and when considering mitigation. Mitigation measures may be needed both within a site, as well as within the transport network external to the development site or area.

Advice

Mitigation measures that might be proposed could include any of the following:

- *changes to the location, use, design and intensity of land use, so that the site or development area is more supportive of the transport networks in the area*
- *new or upgraded crossing points for pedestrian and cyclists at key points*
- *dedicated cycling networks or shared path facilities*
- *introduction of bus priority measures*
- *upgrading public transport stops and providing real time signage*
- *providing for shared or remote parking and car pooling*
- *upgrading existing intersections to provide for all travel modes*

9. Consultation summary & implementation plan

One of the most important aspects of a complete ITA is outlining how necessary infrastructure upgrades will be funded and who will be responsible for providing the measures.

Where changes are needed to the transport network beyond the development, it is imperative that these measures are discussed with the relevant transport authority. ITAs identifying infrastructure upgrades as necessary to mitigate adverse effects, but which do not go on to identify who will be responsible for these measures, how they will be funded, and by when, will not meet the requirements of an ITA.

Advice

This section should detail the discussions that have been had with relevant agencies, and the agreements reached. Where mitigation projects are identified and the following information should be provided in the ITA:

- *concept plans for any required infrastructure upgrades*
- *estimated cost of the upgrades or new facilities*
- *confirmation of who will be responsible for providing the infrastructure or services and by when*
- *source of funding*

10. Conclusions

This section should summarise the development, the assessment that has been undertaken, and any changes or mitigation recommended to ensure an acceptable proposal.

Advice

It should describe:

- *The nature of the land use proposed, the overall structure for the area (where appropriate) and how the development has been designed to integrate with existing and future transport networks*
- *The mode shares being targeted by the development, and the measures that will be implemented to meet those targets*
- *Any mitigation measures that are proposed, including the costs, how they will be funded and who is responsible for providing them*
- *How the mitigation measures proposed in the ITA have been captured in the layout, recommended conditions and the design. In particular, the monitoring or staging clauses that have been inserted to ensure that mode shares targeted in the ITA are actually met.*

Planning Scheme Policy
Neighbourhood Design

For State Approval - Major Amendment 1 - December 2017

Planning Scheme Policy

Neighbourhood Design

Contents

Adoption

Moreton Bay Regional Council adopted this planning scheme policy on _____

Commencement

This planning scheme policy will take effect from _____

1 Introduction

This policy supports the Moreton Bay Regional Council Planning Scheme and has been made by Council in accordance with Chapter 3, Part 4, Division 2 and Part 5, Division 1 of the *Sustainable Planning Act 2009*.

The MBRC Planning Scheme emphasises the importance of place making and urban design to create attractive and liveable neighbourhoods. This is particularly important as the scheme seeks to accommodate more people and jobs with new and existing urban areas.

All new development will be planned, designed and delivered to a high standard, to respect and respond to local conditions, including:

- Connections to existing facilities and local movement networks
- Flood hazards
- Environmental networks
- Physical features
- The local market
- Cultural heritage
- Views and vistas

1.1 Purpose

The purpose of this policy is to:

- Provide a guide for the design of reconfiguring a lot applications which achieve the outcomes of the applicable parts of the planning scheme.
- Provide guidance to the information required when submitting development applications.
- Identify the key attributes of neighbourhood planning

1.2 Application

This policy applies to:

- All Reconfiguring a Lot applications proposing more than 1 additional lot.
- Residential Uses applications on sites with an area greater than 6,000m^2

1.3 Structure

This guide is in three parts with one appendix:

Part 1—Site Assessment and Conceptual Design

Describes the process of design, from site analysis through to lot layout. It illustrates how proposals should respond to the site and its surroundings.

Part 2— Residential Areas

Elaborates on the Performance Outcomes described in the MBRC planning scheme. It illustrates good practice in the design of residential areas and associated centres and shows some of the ways to achieve compliance with the scheme.

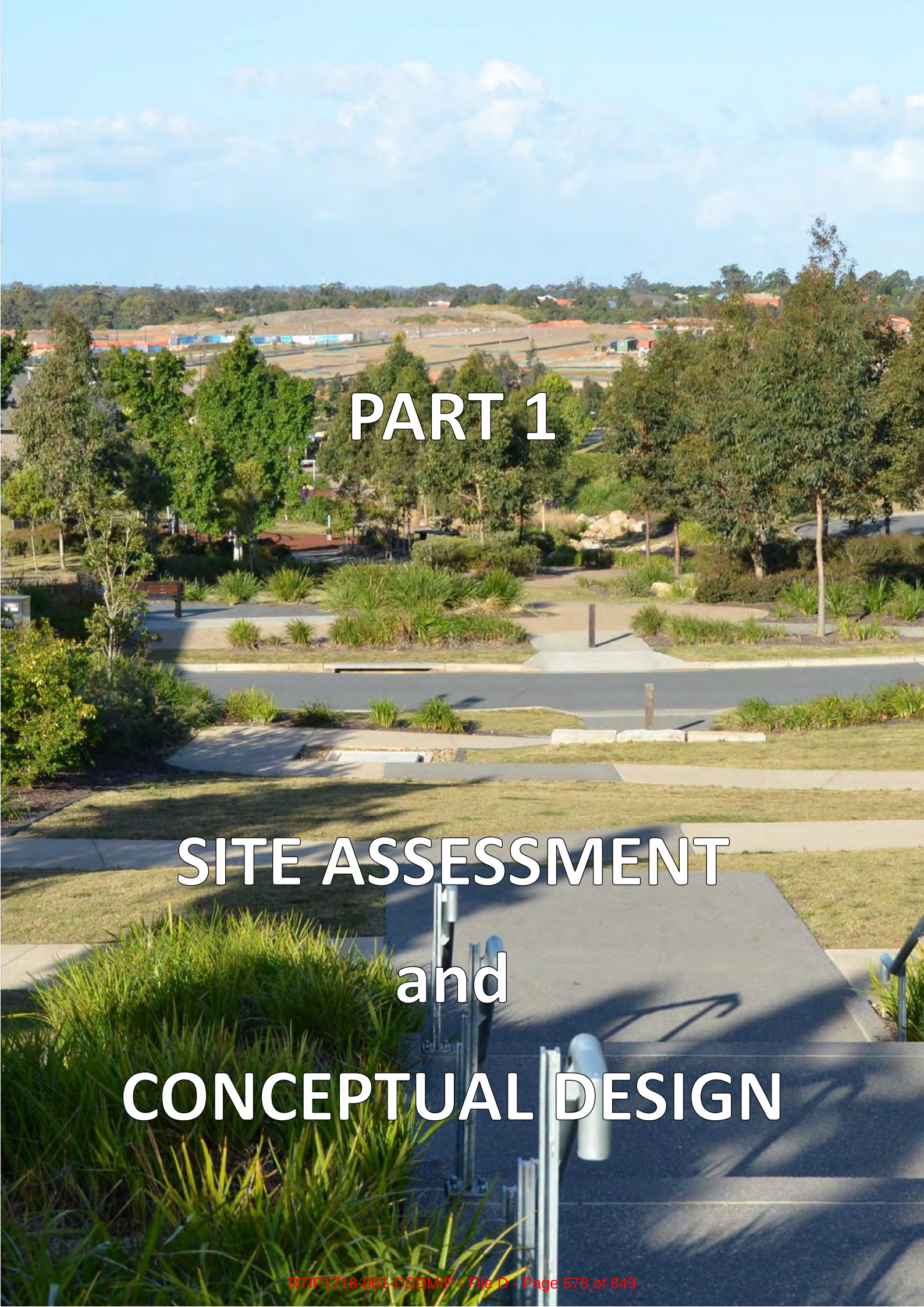
The matters are addressed in the order they appear in the scheme, in the various precincts of the General Residential and Emerging Community zones. Note that the matters always appear in the same order in the scheme, although the PO numbers are not always the same. A table is provided in each section to show the applicable POs in each precinct.

Part 3– Employment and Enterprise Areas

Elaborates on the Performance Outcomes for the various Industrial Zone precincts and shows some of the ways to achieve compliance with the scheme.

Appendix 1—Movement Network Diagrams

Consists of a series of diagrams illustrating how Council expects various parcels of land to be developed with through connections.



PART 1

SITE ASSESSMENT and CONCEPTUAL DESIGN

2 Site Analysis and Conceptual Design

2.1 Site Analysis

A comprehensive analysis of the site and its surroundings should be undertaken before the layout is designed. Each site is unique and will require its own unique approach to development. The site layout must be designed around the unique features of the site and its surroundings.

The first stage is to map the significant features of the site. Some of the matters that will need to be considered are outlined below. Council may request an applicant to demonstrate that appropriate site analysis has been undertaken as part of the Reconfiguring a lot application.

Figure 1: Example of a Site Analysis

Items to Include in a Site Analysis

Site Features	• Location of mature trees • Contours and changes of level • Orientation of site • Any unstable or contaminated land • Prevailing winds • Water courses, creeks and floodable land • Cultural heritage
Green Infrastructure Network (GIN)	• Areas of environmental significance and corridors (refer to Planning scheme policy – Environmental areas and corridors) • Koala vegetation and movement patterns • Habitat for native fauna • Vegetation that will need to be offset if cleared
Surrounding Activities	• Adjoining zoning now and future intent • Adjoining existing land use • Adjoining development interface – eg fencing and whether lots front onto or back onto the site. • Location of focal points (schools, community facilities, shops, public transport, etc) • Open outlooks and views
Movement Patterns	• Pattern of roads, walkways and parks within site and on adjoining site. This should identify all points of connection to the site. • Transport routes including arterial roads, highways and public transport routes that would serve the development. • Existing and potential access points, including intersection spacing. • Existing and desired pedestrian and cycling routes • Bus routes and public transport • Walkable catchments of rail stations • (800m radius circle of the station) • Limited Access Roads • Condition and formation standard of existing roads
Open Space and Stormwater	• Access to open space. • Overland Flow paths, creeks etc • The need for on site management of stormwater
Infrastructure	• Existing sewage and water infrastructure • Easements • Other infrastructure • (eg power lines, gas, telecommunications)

2.2 Outline Plan

The development must have an overarching structure that responds to its surroundings and the matters identified in the site plan. Developments must take advantage of the unique characteristics of their site and also be part of the structure of the town in which they are located.

An outline plan shows how to respond to the site characteristics and guides the development of the urban structure. It demonstrates how the neighbourhood will function as part of a wider urban area.

The analysis should identify routes to and through the site along desire lines. The aim should be to connect the development in with its surroundings and to provide direct connections through the site, particularly to obvious nodes such as neighbourhood hubs or public transport.

The road hierarchy through the site should be identified at this stage. The roads identified below act as a framework for access and a starting point. Once the major roads have been identified, the minor roads can be structured around them.

Outline Plan Responding to Site Analysis

2.3 Refining the Layout

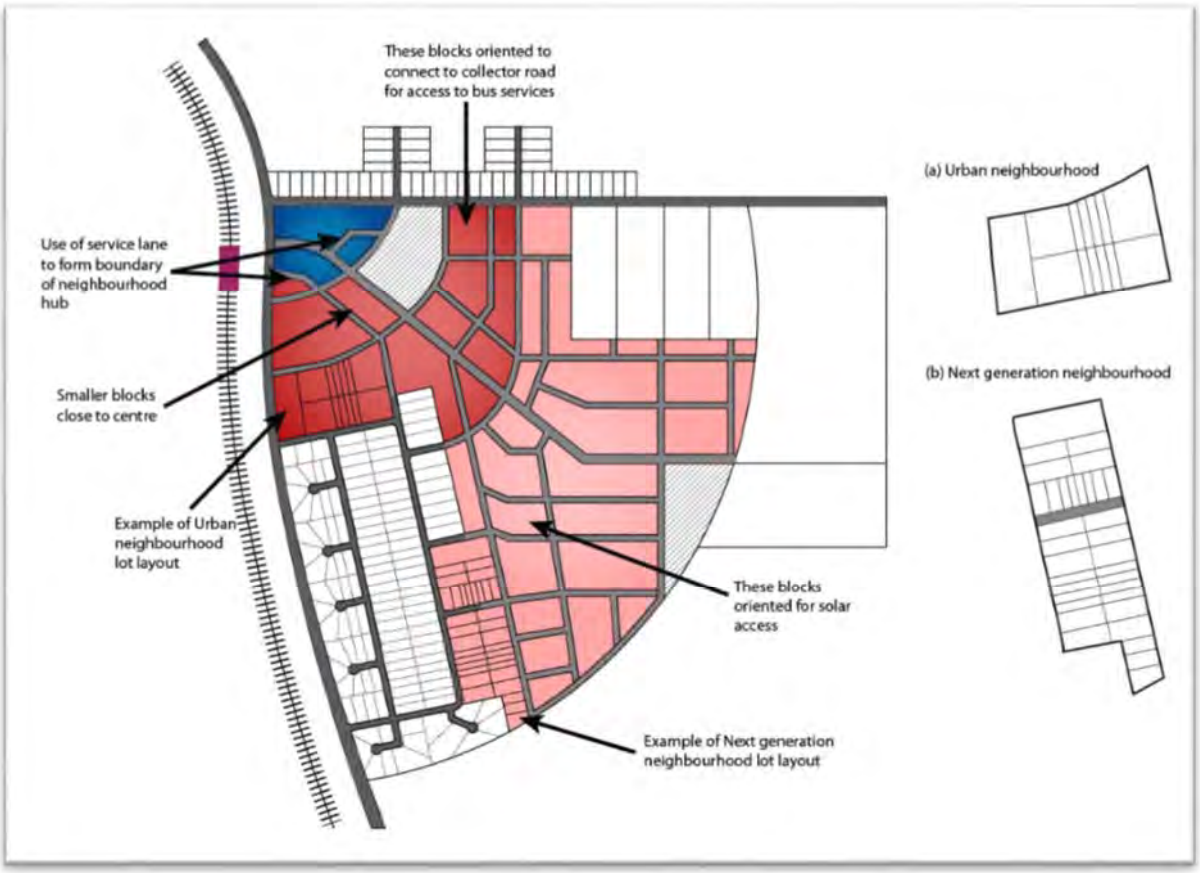
Drawing a layout plan is an iterative process as all the different layout considerations must be taken into account. Making changes to one aspect of the design (such as the position of a park) will affect how the neighbourhood functions, and require subsequent changes to other aspects of the design (e.g. the road layout).

Once an initial layout plan has been devised, it should be refined to ensure that it works for the type of development expected. Consideration should be given to matters such as the size and orientation of blocks, development densities, and street types., as shown on the diagrams that follow

These are the matters described in Part 2 of this guide.

Initial Layout plan

Layout Refinement—Road Typologies



Layout Refinement—development form

PART 2

RESIDENTIAL AREAS

3 Density

3.1 Definition

There are three measures of density used in the planning scheme:

- Land use intensity
- Dwellings per hectare (d/ha)
- Lots per hectare (lots/ha)

Reconfiguration Code	
Zone	**PO**
Coastal	
Suburban	
Next Gen	
Urban	
Transition	3

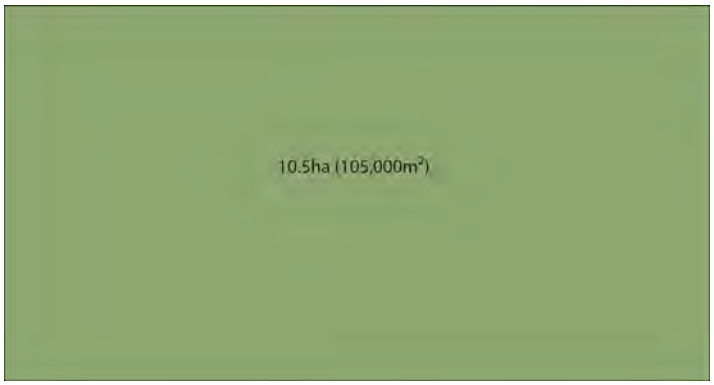
[will be completed after scheme adoption]

Land Use intensity

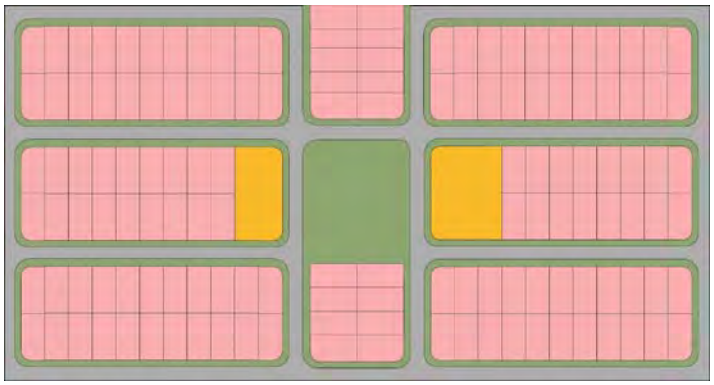
This measure is used in the Strategic Framework, which seeks a minimum of 35 residents or jobs per hectare, regarded as the minimum density to support a reduction in vehicle dependency.

The aim of meeting this target is translated into the scheme in the way that it identifies land uses, density, building and lot forms.

Some areas, such as the urban precinct, have higher minimum densities. This supports the aims of Council to raise the intensity of use in these areas above the minimum level. Other areas (eg suburban neighbourhoods) have a maximum density either because they are not centrally located or they have an established low intensity which is not intended to be changed in the life of the planning scheme.



Development Site: 10.5ha of developable area



Lot Layout. 142 lots (including 2 large lots for dwelling units). Net Residential Density is 13.5 lots per hectare (142 lots / 10.5ha total area)

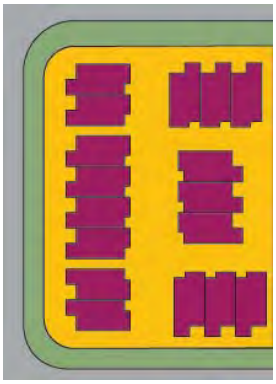
Dwellings or Lots Per Hectare

These measures are used in the general residential zone and reconfiguring of a lot (RAL) codes. Both measure the number of houses per hectare of land. The minimum density specified in the next generation RAL code—15 d/ha—is consistent with the 35 people per hectare specified in the strategic framework.

- **Net Residential density** is used for reconfiguring a lot and measures *lots per hectare.*
- **Site density** is used in the zone code and measures *dwellings per hectare*. It is generally used for individual sites after reconfiguration.

The creation of new lots requires the creation of new roads and infrastructure. Typically, this takes up a third of the pre-development site.

This infrastructure does not need to be provided at the dwelling stage. For this reason, a site density (dwellings per hectare for the development site only) will be higher than net residential density.



Site Density is 63 dwellings per hectare on this multiple dwelling site
(17 dwellings / 0.27ha site area)

Site Density and Net Residential Density

3.2 Measuring Density

All residential density measures are calculated using the same basic ratio formula: the number of dwellings divided by the area of land they occupy.

$$\text{Residential Density} = \frac{\text{Number of lots or dwellings}}{\text{Land Area}}$$

Site Density

A site density is calculated from the site area and the number of dwellings. Some examples are:

- 1 dwelling on 500m2 = a site density of 20 d/ha.
- 2 dwellings on 500m2 = a site density of 40 d/ha.
- 10 dwellings on 1500m2 = a site density of 66.6 d/ha

A calculation for site area is as follows:

$$\text{Site Density} = \frac{\text{Number of lots or dwellings}}{\text{Site Area (ha)}}$$

Net Residential Density

Net residential density is the number of lots or dwellings divided by the total area for development – known as the *developable area.* This area includes certain items of infrastructure (such as local roads) but excludes others. The box on the right shows what is included in *developable area*.

The calculation for Net Residential Density is:

$$\text{Net Residential Density} = \frac{\text{Number of lots or dwellings}}{\text{Developable Area (ha)}}$$

Developable Area

Land Included in Calculation

- All land for residential purposes
- Land for mixed use containing residential uses
- Land for local parks
- Land for local roads (including half of road bordering the site).

Land Excluded from Calculation

- Land for purposes other than residential
- Parks servicing the broader region (eg district parks)
- Sports fields
- Higher order roads (arterials, sub arterials or district collectors)
- Land deemed to be undevelopable due to constraints such as flooding, future roads requirements, steep land and significant vegetation

Net Residential Density Inclusions

3.3 Converting between Site Density and Net Residential Density

A net residential density includes the land required for roads and local parks. As a result it will always be lower than site density. A typical outcome is that around a third of the land will be used for roads and parks.

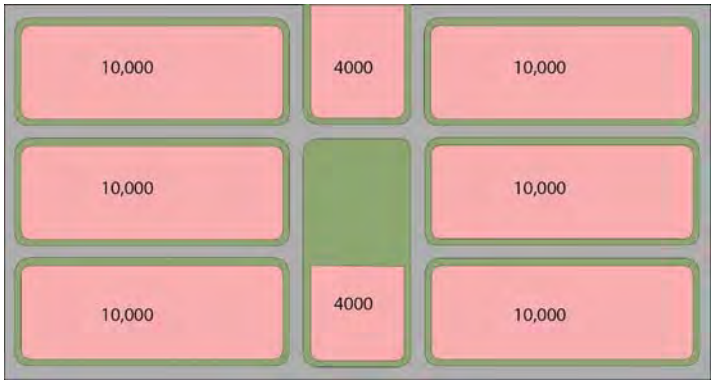
A site development is not always associated with a reconfiguration application, but it is useful to be able to compare the densities in a single measure.

As a result, the MBRC planning scheme includes an assumption. To convert between site density and net residential density, the amount of land used is inflated by 1.5 as shown below.

- 5 dwellings on a combined site area of 1000 m2 = 50 d/ha site density.
- To convert this to net residential density we multiple the land area by 1.5: the same 5 dwellings on (1000m2 * 1.5 [1500m2]) = 33.3 d/ha net residential density.

This conversion should not be used for larger sites required to provide their own internal public roads or public open space i.e. greenfield RAL development. Site density applies to Material Change of Use development.

Development Site: 10.5ha of developable area



Site Area: 6.8ha of land is available for sites

Developable Area: In the example above 6.8ha is available for lots out of a total developable area of 10.5ha. 6.8ha * 1.5 gives a calculated developable area of 10.2ha.

Density in the MBRC Planning Scheme	**Residential place types / General residential zone precincts**			
	Coastal Communities Place type/ precinct	Suburban Place type / precinct	Next generation Place type/ precinct	Urban Place type / precinct
Strategic Framework	N/A	Max 11 dwellings/ ha – Net residential density	35 people and/or jobs per ha [1]	60 people and/or jobs per ha [2]
Reconfiguring a lot code (Net Residential Density)	Max 11 lots/ha	Max 11 lots/ha	11-25 lots/ha	N/A [3]
General residential zone code (Site Density)	Max 15 dwellings/ ha	Max 15 dwellings/ ha	No site density requirements	Min 45 dwellings/ha or Min 75 dwellings/ha –

1—equates to 15 dwellings / ha
2—equates to 30 dwellings / ha
3- must not compromise the precincts future ability to achieve a minimum site density of 45 dwellings

4 Housing Diversity

Reconfiguration Code	
Zone	**PO**
Coastal	
Suburban	
Next Gen	
Urban	
Transition	4,5,6,7,8,9

[will be completed after scheme adoption]

The Moreton Bay Regional Planning Scheme aims for a variety of dwelling types to be built in the region, especially in Next Generation Areas.

Dwelling diversity provides a mix of dwellings that meet the different needs of a wide range of people in society.

Housing diversity enables neighbourhoods to provide for changing demograhics, helps address affordability issues and provides for different lifestyle choices and life stages.

A diversity of housing can also contribute to visual interest on a street scape.

MBRC has developed 5 principles for delivering successful housing diversity.

Principles for successful housing diversity

Affordability	Affordability is a key principle of housing diversity. The house types need to take into consideration all aspects relating to cost, not just the cost of construction. These costs include proximity to employment, schools, public transport and services and the use of materials, equipment and technology that reduce the running cost of a home. For the subdivision of land, developers should consider issues such as orientation, lot design and distribution and location of densities to promote environmental sustainability.
Amenity	Amenity for the occupants of new dwellings and for surrounding neighbours is a significant issue that must be addressed when designing for housing diversity, particularly in established areas. Building designs that consider the streetscape, prevailing breezes and access to winter sun, both on-site and on neighbouring premises, will ensure that the amenity for occupants and their neighbours is maintained. At the subdivision stage, consideration of these issues is important especially with regards to the design and placement of smaller allotments and the use of retaining features within lot boundaries.
Privacy	Privacy for the occupants of new dwellings and for surrounding neighbours is regularly raised as a major concern where smaller allotments and units are proposed. Appropriately designed dwellings will ensure that privacy, both visual and acoustic, is maintained, whilst not impeding active streetscape outcomes and neighbourhood interaction.
Wide Choice	The housing market for smaller homes is not limited to one particular house type or lot size. A wide range of housing product needs to be delivered to ensure that there is adequate choice for homebuyers at varying stages of life and in varying financial position, and to ensure diversity within the overall streetscape.
Salt and peppering	It is important that diverse housing forms are not clustered in only one location in a neighbourhood, but that they are dispersed in a variety of locations. There may still be localised 'clustering' of housing types, however, it should not be to an extent which clearly identifies an area as being different to otherwise similar areas. The secret to successful housing diversity is to normalise it.

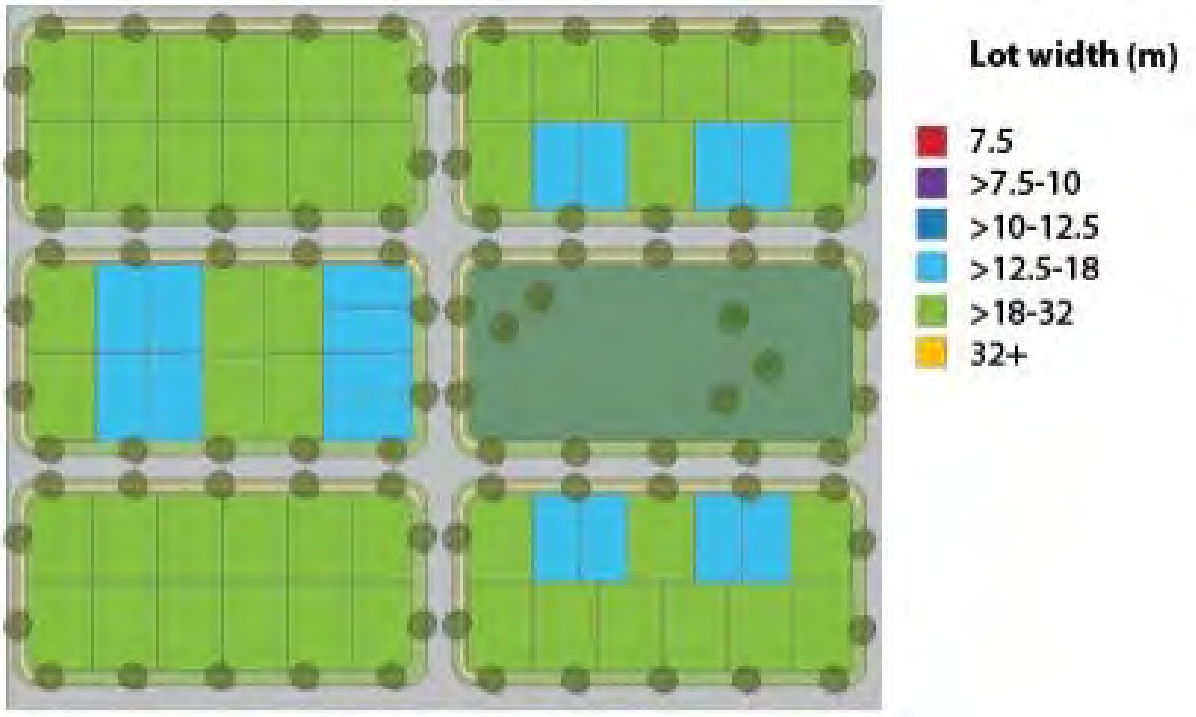
4.1 Lot Types and Lot Mix

The mechanism used in the planning scheme to provide for housing choice is a diversity of lot widths. Lot depths are expected to be constant (between 25m and 35m) with a variation in size created by varying the width along the street. Wider lots (above 32m) are provided for multiple dwelling typologies.

Different lot mixes are required depending on the precinct in the planning scheme.

The following diagrams illustrate how the lot mix can be achieved. These are for conceptual purposes only and should not be relied upon for justification against the Performance Outcomes of the code.

Suburban Neighbourhood Precinct

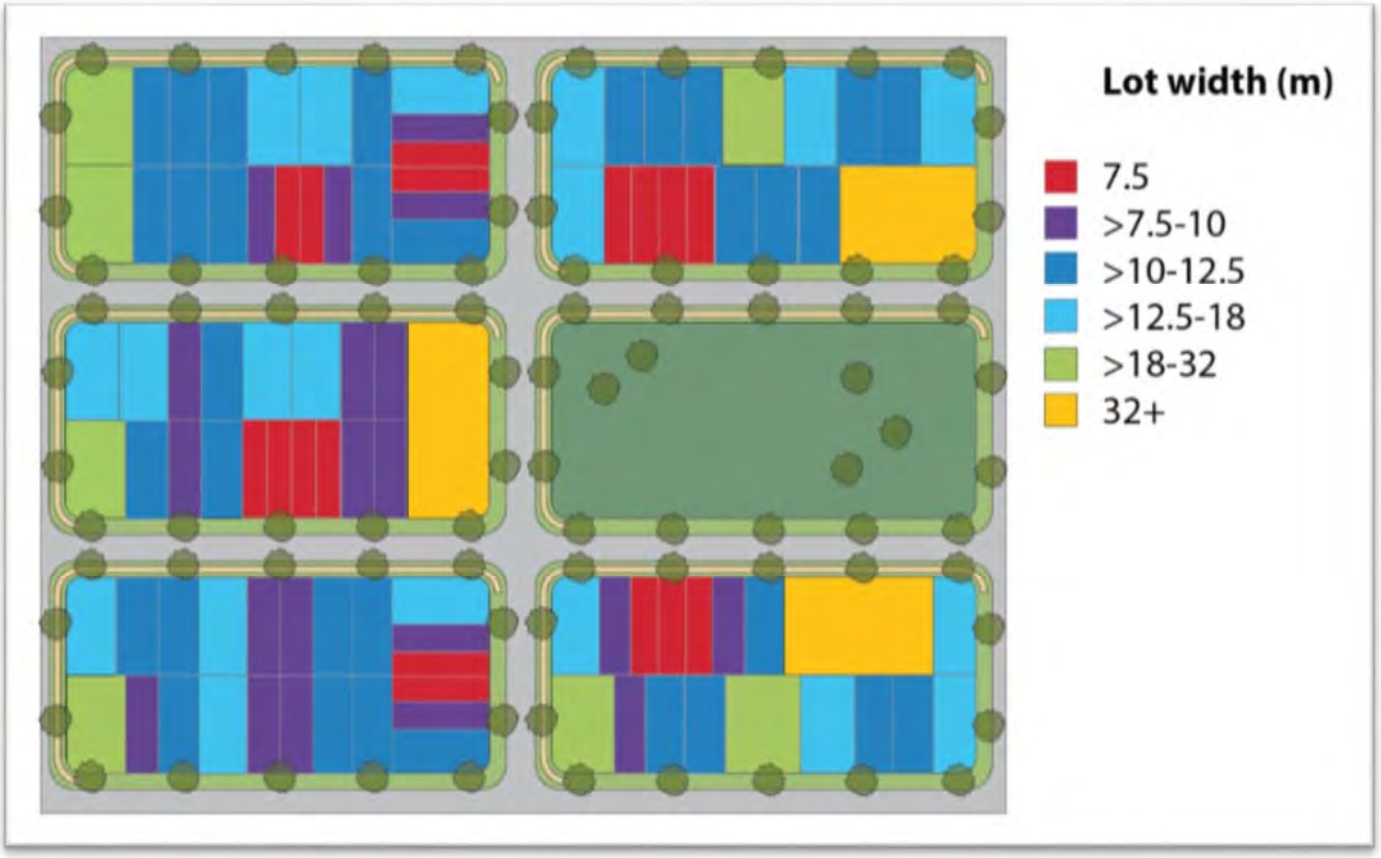


Conceptual Suburban Neighbourhood

Total Site Area	3.9 Ha
Total Lots	64
Average Lots / Block	12.8
Site Density	16 lots / Ha
Average Lot Size	609m^2
Net Density	10.6 lots / Ha

Breakdown of lot types			
Lot Type (frontage width)		*No. of Lots*	
D	>12.5 - 18m	16	
E	>18 - 32m	48	

Next Generation Neighbourhood Precinct



Conceptual Next Generation Neighbourhood

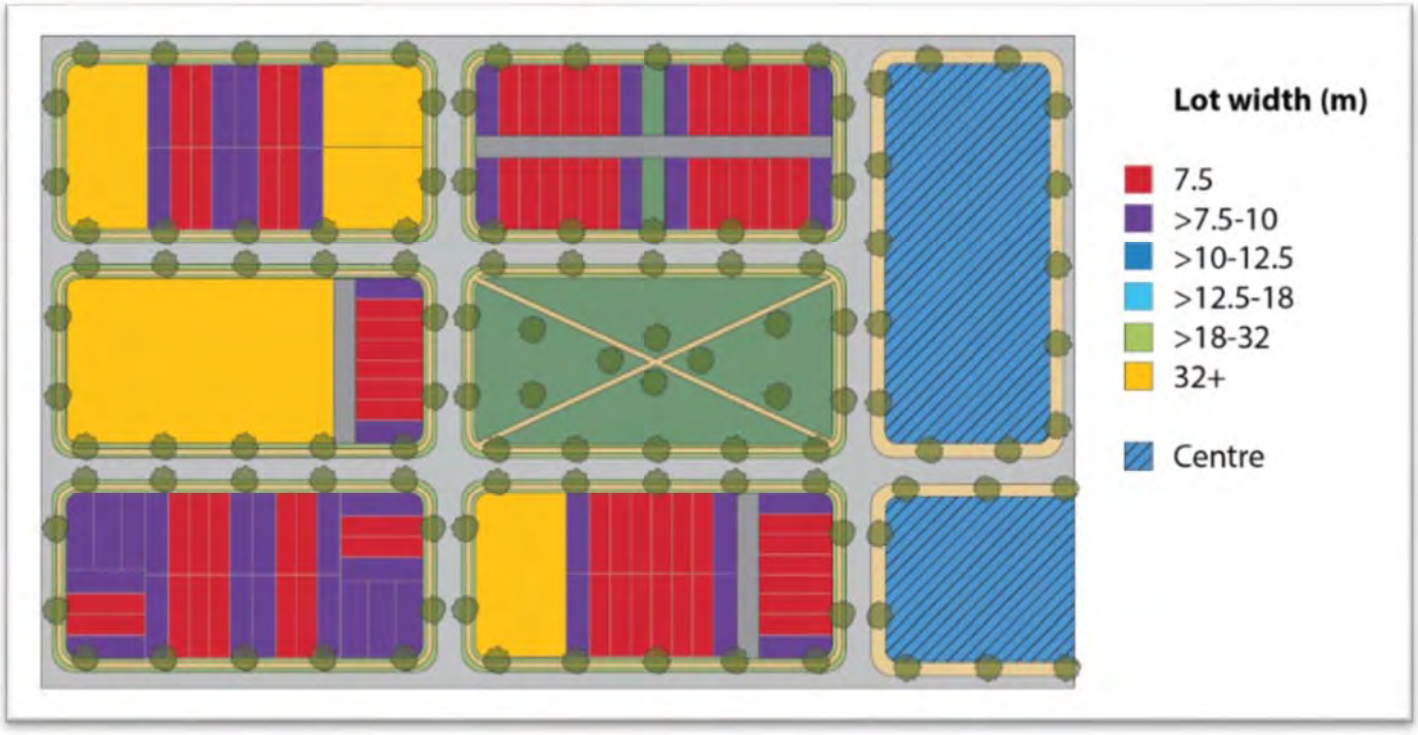
Total Site Area	3.9 Ha
Total Lots	99
Average Lots / Block	19.8
Site Density	25.4 lots / Ha
Average Lot Size	393m^2
Net Residential Density	16.5 lots / Ha

Breakdown of lot types			
Lot Type (frontage width)		*No. of Lots*	*% of total lots*
A	7.5m	17	17.2 %
B	>7.5 - 10m	20	20.2 %
C	>10 - 12.5m	33	33.3 %
D	>12.5 - 18m	19	19.2 %
E	>18 - 32m	7	7.1 %
F	>32m	3	3.0 %

Following Comprehensive Redevelopment of 30m+ frontage lots	
Total dwellings	111
Average dwellings / block	22.2
Site Density	28 dw / Ha
Net Density	18.4 dw / Ha

Mixed Density Next Generation Neighbourhood designed around a central park

Urban Neighbourhood Precinct



Conceptual Urban Neighbourhood

Total Site Area		3.9 Ha	
Total Lots		117	
Average Lots / Block		23.4	
Site Density		30 lots / Ha	
Average Lot Size		333m^2	
Net Residential Density		19.8 lots / Ha	
Breakdown of lot types			
Lot Type (frontage width)		*No. of Lots*	*% of total lots*
A	7.5 m	70	59 %
B	>7.5 - 10 m	42	35 %
F	>32 m	5	4.2 %
Following Comprehensive Redevelopment of 30m+ frontage lots			
Total dwellings		175	
Average dwellings / block		33	
Site Density		45 dw / Ha	
Net Density		30 dw / Ha	

5 Street Design and Layout

Reconfiguration Code	
Zone	**PO**
Coastal	
Suburban	
Next Gen	
Urban	
Transition	15

[will be completed after scheme adoption]

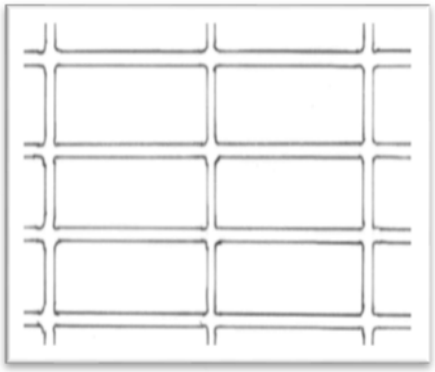
5.1 Grid Structure

Cities were traditionally built on a grid structure with a walkable perimeter of around 400m-800m. For instance, much of Brisbane has a grid with dimensions of 100m x 200m. This structure ensures that it is possible to walk anywhere within the area relatively easily.

More recently, with the widespread use of cul-de-sacs and other forms of poorly connected road pattern, street layouts have become less well connected and urban areas less walkable.

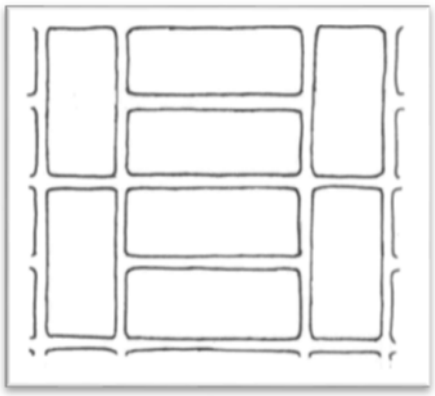
Rectalinear Grid

Traditional city structure is connected and supports change over time.



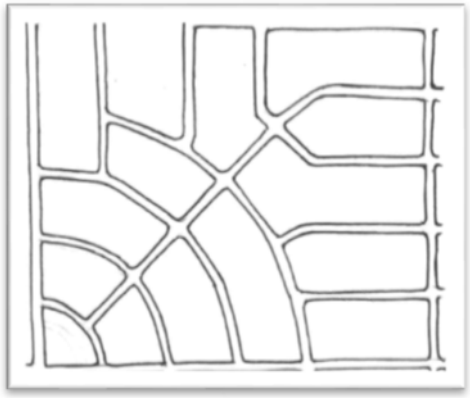
Modified Grid

A modified grid such as the one on the right can be used provided it has an overall structure that is legible. This example has a choice of direct routes running north-south and east-west even though the orientation of grid cells is alternated.

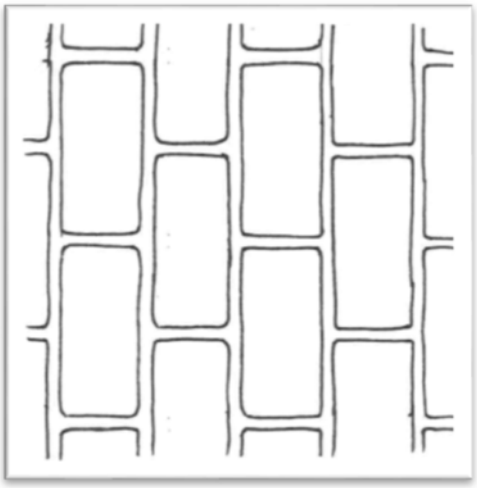


Radiant Grid

Radiant grids are a way to respond to a focal point such as a station or town centre as they minimise travel distances from a central point. Away from the focal point, the grid should transition to a rectalinear form.

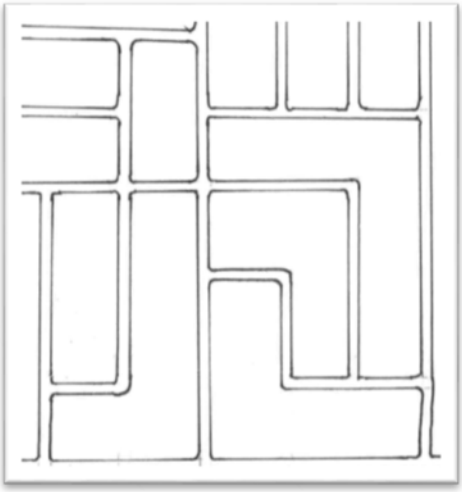


Non-preferred Road Patterns



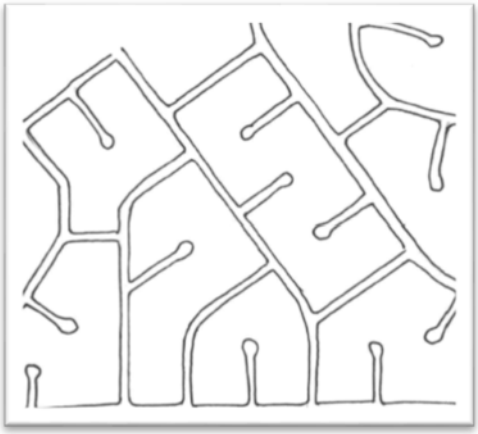
Offset Grid

This example does not provide good east-west connections



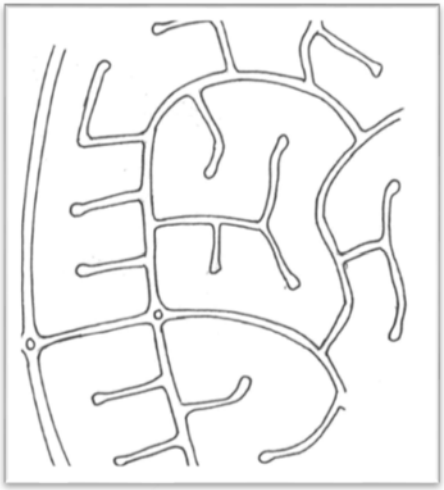
Fragmented Grid

Does not have the structure or legibility of a regular grid



Loops and Lollipops

The occasional use of cul-de-sacs within a structured grid may be acceptable, but their widespread use must be avoided.



Dendritic

Highly disconnected car-dependent layouts are not acceptable

Fake Grid

A fake grid has many of the attributes of a grid based layout but is not well connected. It does not provide direct routes for travel and is not legible.

5.2 Block Dimensions

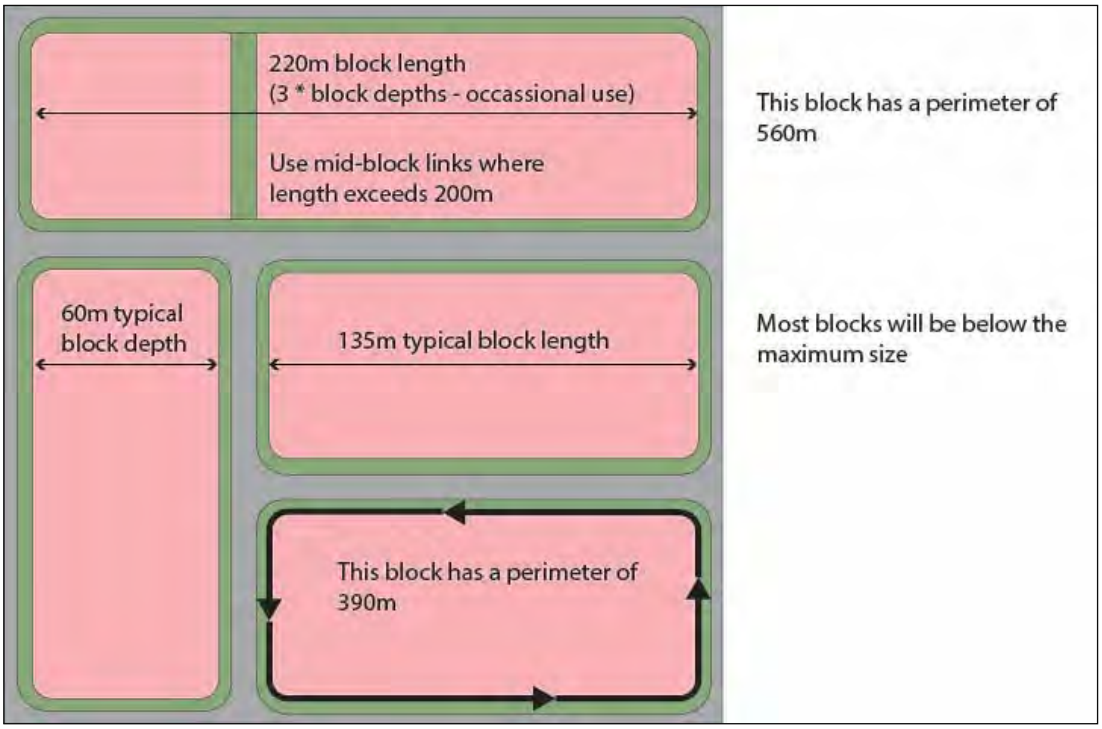
Blocks will generally have a depth of between 50 and 70m. Block width will usually be around 2-3 times the depth of the block.

The maximum block dimension depends on the residential precinct in which the development is located, as shown below. Block lengths greater than 200m should be used sparingly and a mid-point pedestrian link provided.

Reconfiguration Code	
Zone	**PO**
Coastal	
Suburban	
Next Gen	
Urban	
Transition	15, 18

[will be completed after scheme adoption]

General Residential Zone – Precinct	Maximum walkable perimeter
Coastal Communities & Suburban Neighbourhood	600 metres
Next Generation Neighbourhood	500 metres
Urban Neighbourhood	400 metres



Walkable Perimeter

Mid-Block Connection (Caloundra West)

5.3 Connecting to Existing and Future Street Network

Reconfiguration Code	
Zone	**PO**
Coastal	
Suburban	
Next Gen	
Urban	
Transition	16

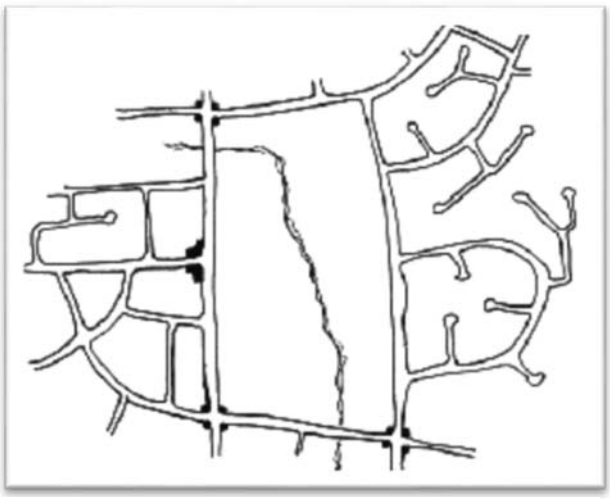
[will be completed after scheme adoption]

Existing Street Network

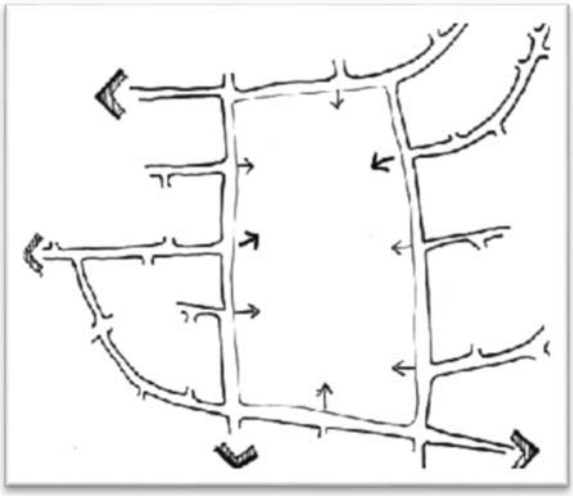
Where there is an existing network around the site, such as for an infill subdivision, the points of connection (both streets and off-road connections) should be identified at the start of the design process.

All new subdivisions should ensure that multiple connections are provided to the external road network for emergency access. On larger subdivisions (> 300 lots), multiple access points will generally be required by the 300th lot. For smaller subdivisions (< 300 lots), multiple connections will be required sooner.

The importance of these connections should be evaluated before a decision is made how connections through the site should be made



1. Development site and surrounds



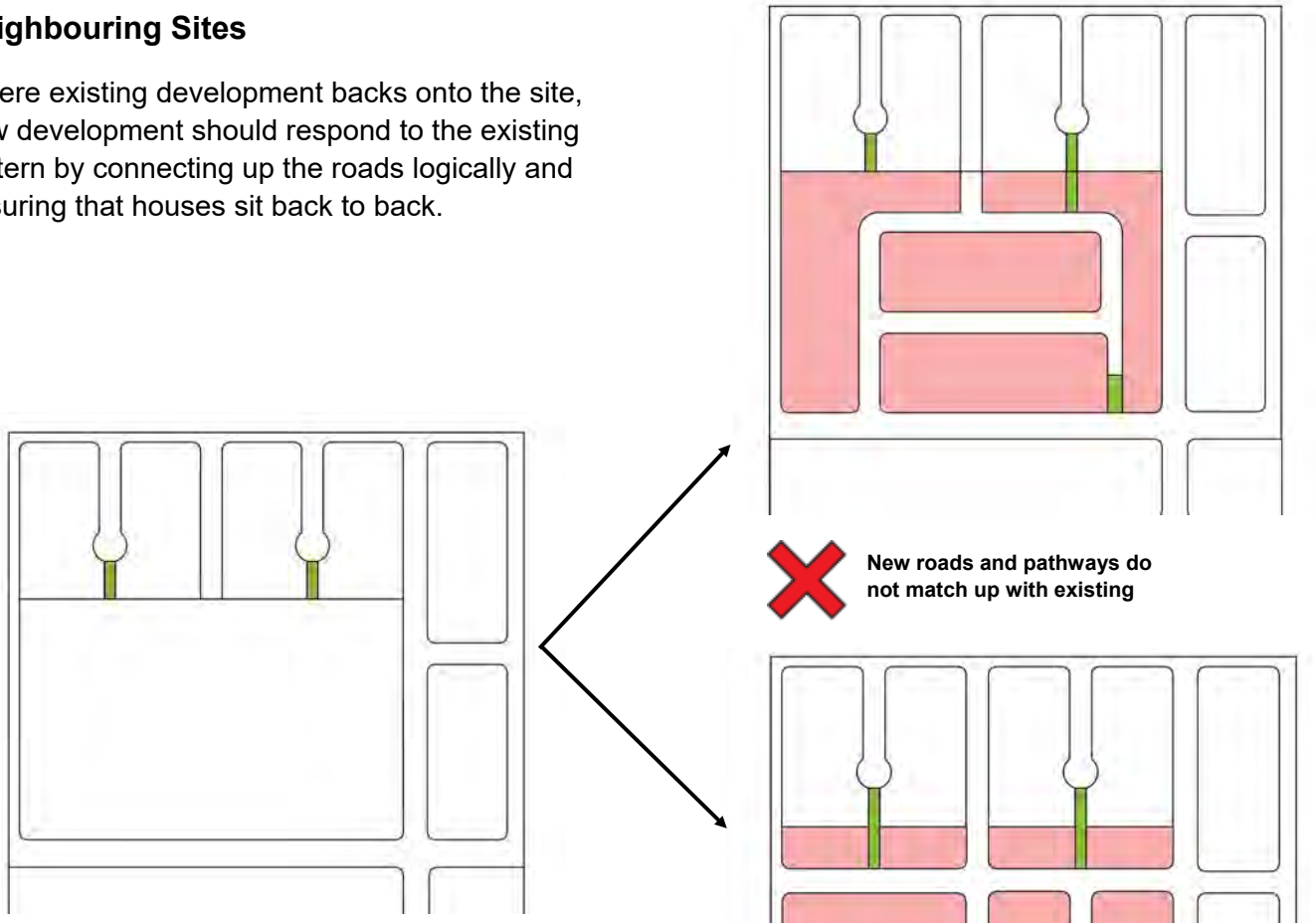
2. Identify points of connection and importance of these points

3. Identify possible road layout for the development

4. Refine layout

Neighbouring Sites

Where existing development backs onto the site, new development should respond to the existing pattern by connecting up the roads logically and ensuring that houses sit back to back.

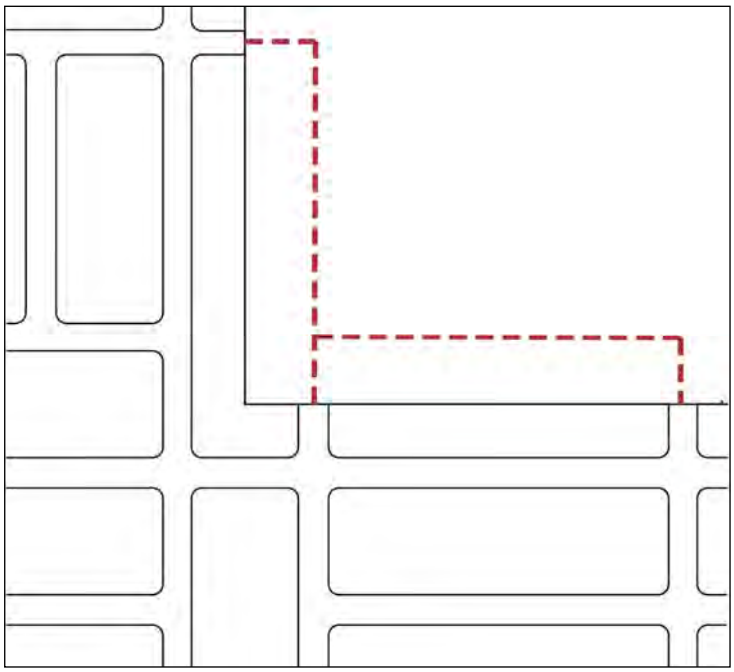


Site prior to development

New roads continue existing roads and are part of grid pattern for wider area

Providing for Future Connections

Where land adjacent to the site will be developed in future, access must be provided in a way that is consistent with a grid pattern, with a maximum block perimeter (as specified in the Reconfiguring a lot code). Future development can then be integrated into grid with appropriate block sizes.



[will be completed after scheme adoption]

Reconfiguration Code	
Zone	**PO**
Coastal	
Suburban	
Next Gen	
Urban	
Transition	16, 18

6 Integration Plans

Where reconfiguration of a lot or large multiple dwelling complexes are proposed, there is a need to ensure that connections are provided to complete a walkable grid.

Where this occurs, an integration plan is required. This is intended to demonstrate that neighbouring properties can be developed in a logical manner and that connections through the area are provided. The integration plan must be drawn over the wider developable area (not just the site and neighbours).

Indications that connections are needed are:

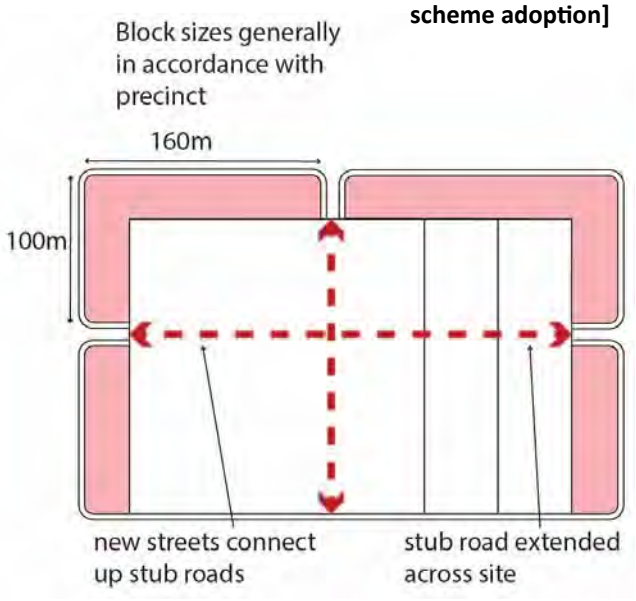
- To complete the street grid at the perimeter block required for the precinct.
- Where length of street would exceed 200m.
- Where there is an existing road stub
- Where there is a connection shown on a movement network diagram (Appendix A).

Connections will usually be provided in the form of roads, unless there is a reason this is problematic. Where roads are not possible and with the agreement of Council, they may be provided as walking connections.

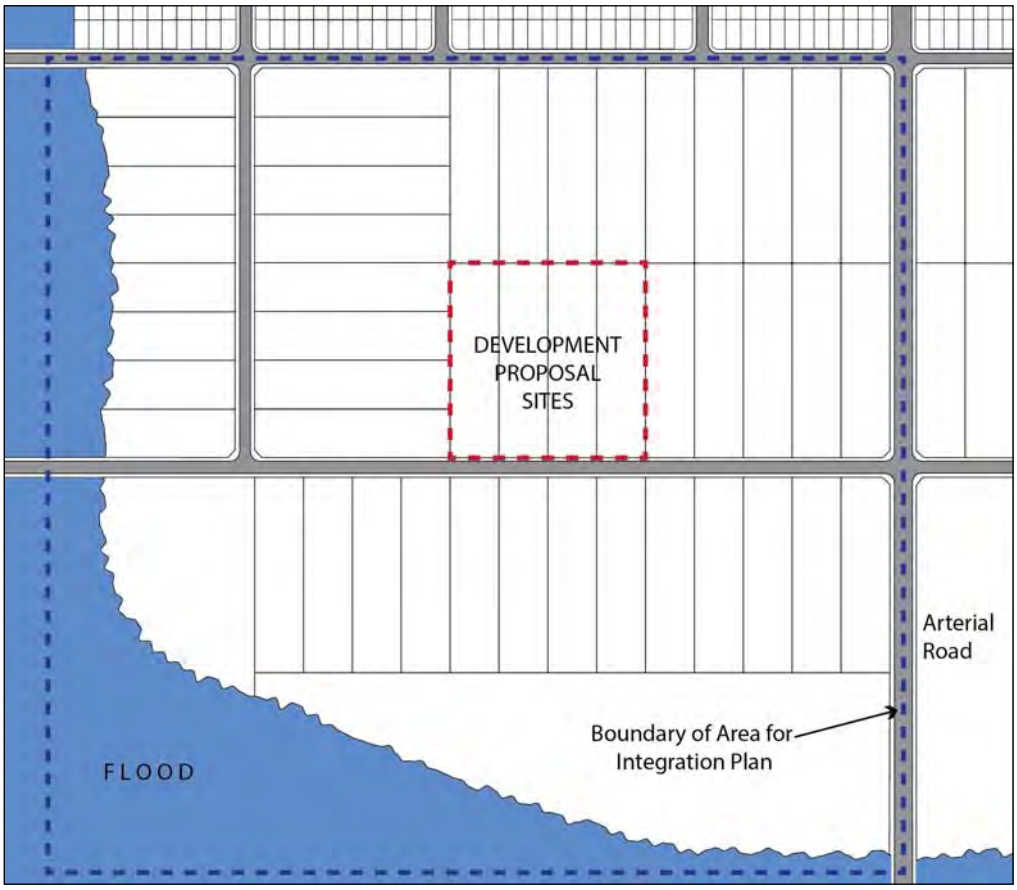
Dwelling House Code	
Zone	**PO**
Coastal	
Suburban	
Next Gen	
Urban	
Transition	17

Reconfiguration Code	
Zone	**PO**
Coastal	
Suburban	
Next Gen	
Urban	
Transition	17

[will be completed after scheme adoption]



Integration of large site within neighbourhood



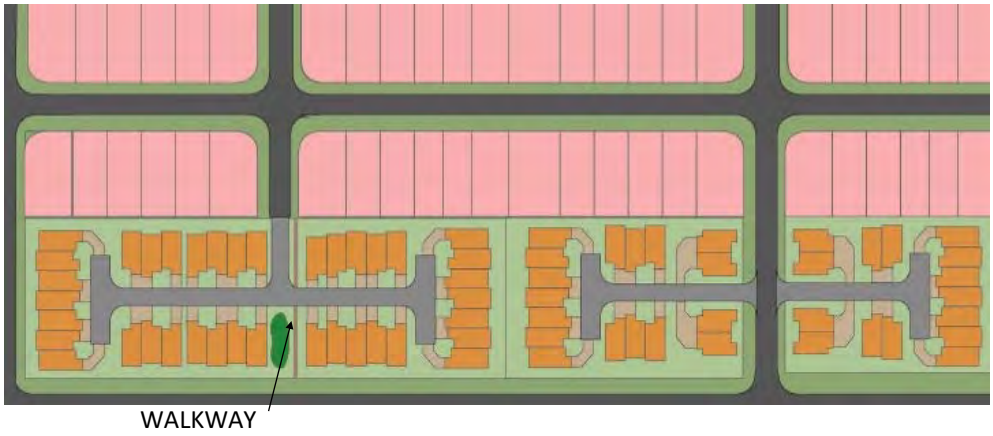
Area for Integration Plan: The Integration plan must be drawn over the logical wider development area, not just surrounding sites. In this example , the boundaries are formed by existing development, flooding and an arterial road.

This development pattern does not provide connections from the existing stub roads and would result in a block perimeter of at least 1km.

This development pattern provides a block perimeter of 600m and uses the existing road stubs in a logical manner

Dwelling Complexes may require new roads

Integration plans will need to demonstrate how units complexes comply with the connectivity standards for the precinct



Connections will usually be provided as roads.

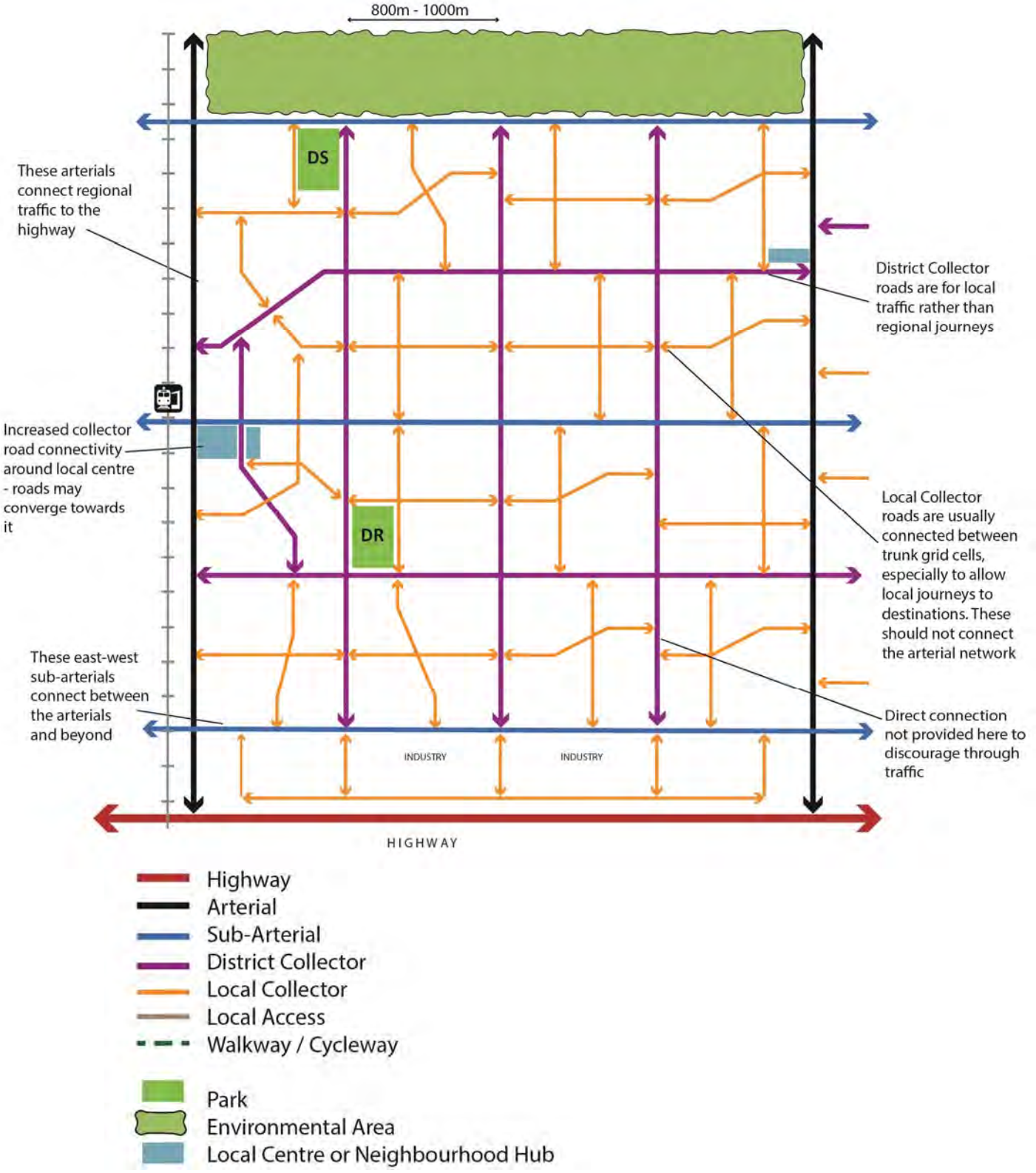
In the example on the left, a walkway is provided as intersection spacing cannot easily be met

7 Street Hierachy

The diagram below is a model of a large suburb with a population of around 25,000 people. It illustrates the pattern of major roads and how they are integrated across developments.

[will be completed after scheme adoption]

Reconfiguration Code	
Zone	**PO**
Coastal	
Suburban	
Next Gen	
Urban	
Transition	19, 26



7.1 Street Hierachy and Structure

Reconfiguration Code	
Zone	**PO**
Coastal	
Suburban	
Next Gen	
Urban	
Transition	19, 26

[will be completed after scheme adoption]

Road Network Plans

Any development where public road will be built will require a Road Network Plan to be drawn. This is a diagram showing how the roads function and the role they perform in the road hierarchy.

Framework Roads

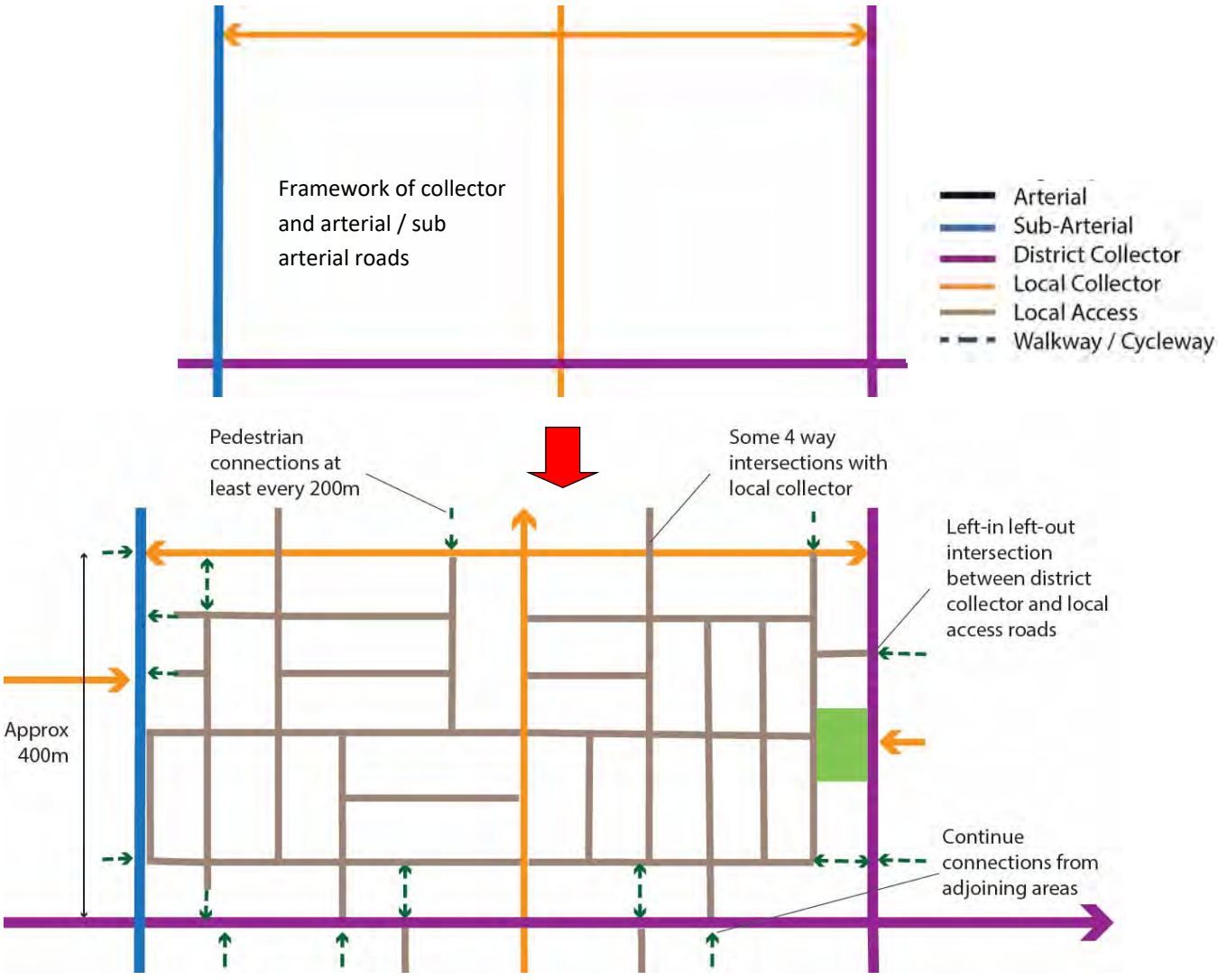
A neighbourhood is structured around a framework of higher order streets (eg local collectors) that act as the main transport corridors and provide for a variety of uses. The first stage of neighbourhood design is the location of these frame roads. The rest of the grid of local streets is then structured around them.

The location of major roads (sub arterial and district collector) will usually be determined by master-planning undertaken by or in conjunction with Council.

Local Streets

The local street network will be a mixture of directly connected streets for local traffic and short streets, most likely in a modified grid.

Streets should form a logical grid pattern with a dimension of not more than 200m to provide for direct journeys. This grid will be formed with a mixture of local collector roads and local access streets, as shown in the diagram.



Grid Built off framework roads

7.2 Local Street Types

Local Collector Roads

Local collector roads will connect between neighbourhoods but will not form a continuous connection between main destinations. They are not intended to provide an alternative route to district collectors. Rather, they distribute traffic within and between neighbourhoods.

The required frequency of local collector roads is a matter of circumstance. They will be needed to provide access between neighbourhoods and centres (and so more will be required around centres). In residential areas, they generally form a grid of 400m-500m dimension.

Local Access Streets

Local access streets are quiet local streets. They should be part of a connected street network and they may provide for some through movement, although the principle traffic distribution should be provided by the local collector.

They may be connected to a District Collector road (usually with a left in left out intersection) but they will not be connected to sub-arterial or arterial roads.

Collector Roads

The design of collector roads may be more complicated than other roads because of the need to take account of the different functions. A collector road is a multi-purpose street which must provide for place activities as well as movement activities. It needs to be a pleasant and attractive place for people, but still provide higher capacity for movement.

Place activities can include space for social activities such as seating areas and space for people to stop and linger; and amenity space such as landscaping and trees. Collector roads are also a good place for commercial activities.

It is important that these streets have a high level of amenity because they also function as liveable streets with direct residential frontage. They are also the best locations for parks and community facilities because of their higher profile.

There are two types of collector roads: Local and District. Local collector roads distribute traffic round a local neighbourhood while district collectors distribute it around a larger area such as a town or suburb. The role of these is shown in the diagram on the previous page.

Individual property access to District Collector roads is not usually permitted. Some alternatives are illustrated in section 9.

Local Collector Road
with rear accessed row housing

7.3 Intersection Types and Spacing

A development layout is greatly influenced by the requirements for intersection spacing, especially where it is close to major roads. These can dictate the orientation of the grid and in some cases whether a connection is possible.

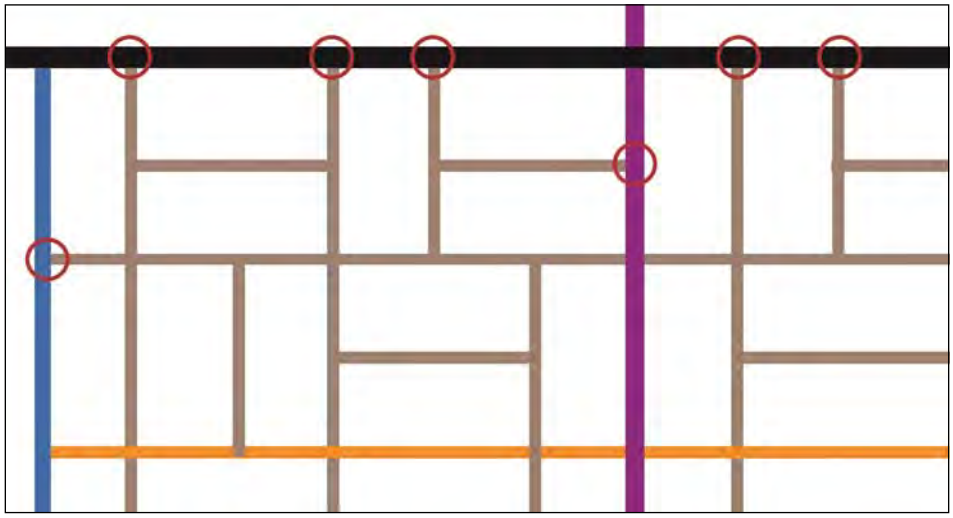
MBRC Planning Scheme intersection spacings are shown on the right and in the diagram below

Road Type	Direct Access	Intersection Spacing	
		same side of road or 4 way)	Opposite side of road
Local Collector or Local Access	Yes	60m	40m
District Collector	Limited	100m	60m
Sub Arterial	No	250m	100m
Arterial	No	350m	150m

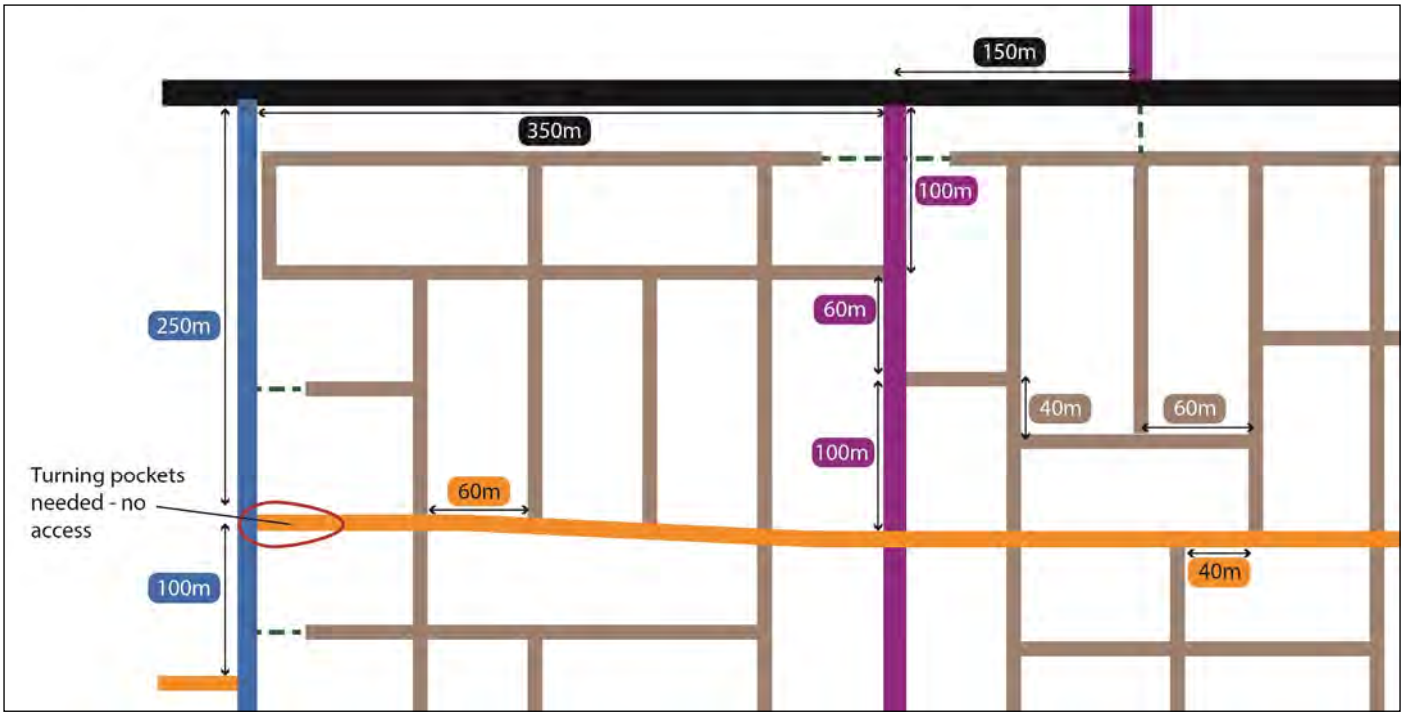
Reconfiguration Code

Zone	PO
Coastal	
Suburban	
Next Gen	
Urban	
Transition	19, 26 [B4 30]

[will be completed after scheme adoption]



A modified grid applied to the higher order roads does not comply with intersection spacing requirements



A development layout designed to comply with intersection spacings. The shape of development is affected by the spacing requirements around higher order roads. The "true" nature of the grid is reduced compared to the modified grid (top)

Four Way Intersections

Four way intersections are an important component of the urban street network. They reduce traffic speeds and make it easier for people to find their way around the neighbourhood.

A grid system is expected to be a mix of 3 and 4 way intersections (known as a modified grid). It should provide a mixture of direct streets for easy way-finding and direct local journeys, and short streets.

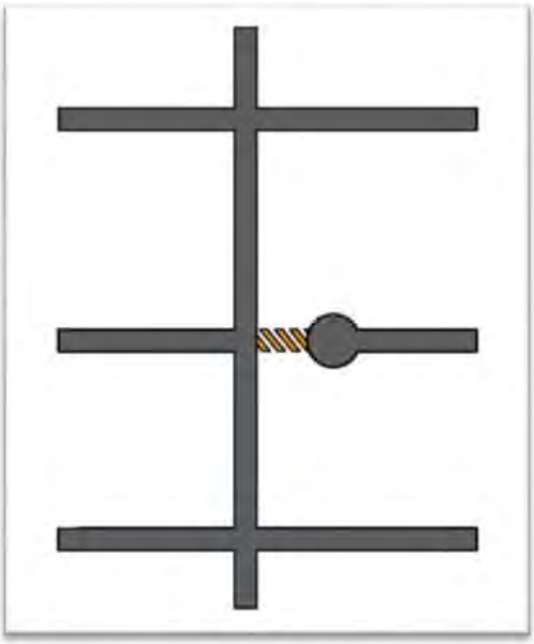
Reconfiguration Code	
Zone	**PO**
Coastal	
Suburban	
Next Gen	
Urban	
Transition	22

[will be completed after scheme adoption]

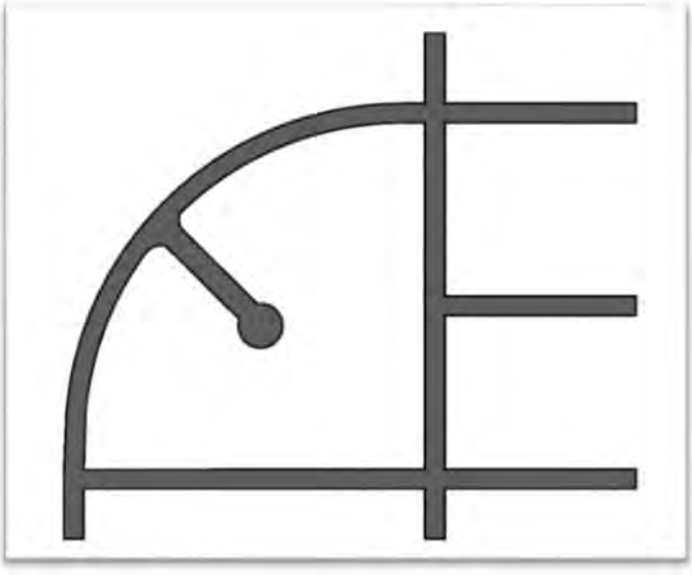
Limited use of Cul-de-sacs

Cul-de-sacs are not a preferred form of development but may be used on occasion as part of a layout that is mostly connected. The use of cul-de-sacs may include reaching an awkward corner of a site or to create a pedestrian only link onto a higher order road (avoiding a four way intersection).

Where cul-de-sacs are used to reach an awkward corner of the site, this should be limited in length and only be where other solutions are not viable.



Intersection Type and Spacing

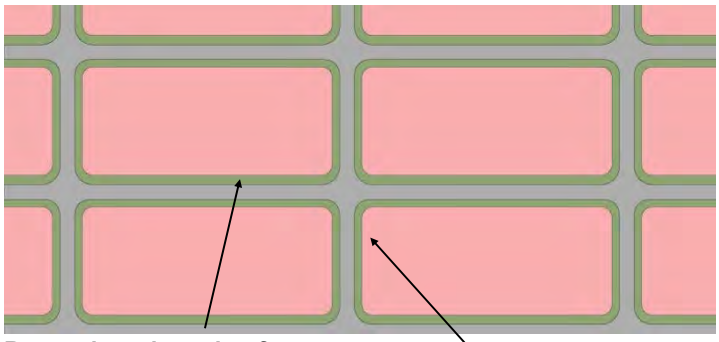


Limited length of cul de sacs

8 Orientation of Streets

For solar access

The best solar access will occur if streets are aligned approximately east-west and this should be the main orientation where possible. Streets that are aligned north-south should generally be the short side of the block. Other orientations should be minimised where possible but may be used to fit in with other design aims.



Best solar orientation for houses is on east – west streets

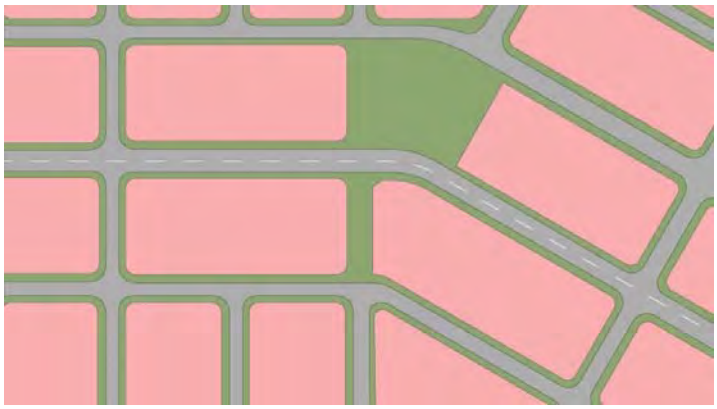
Short side of grid on north-south roads

Solar Orientation

To complement a frame road or provide direct access to focal point

Sometimes a frame road will run through the development. These may be oriented to provide direct connections to neighbourhood hubs, public transport, parks or other focal points and buses may run down these roads. Because of this, these roads may not be oriented east west or north south and this may disrupt the grid.

If the grid is focussed on a station or neighbourhood hub, then this may also disrupt the orientation. The radiant grid in section 6.1 is an example of this .

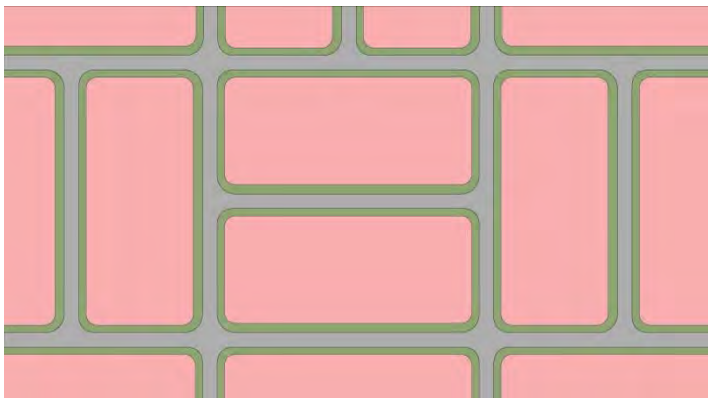


Blocks oriented to provide access to frame road (eg district collector)

To Manage the number of four way intersections

Four way intersections provide legibility and reduce traffic speeds. They are an important component of residential design.

However, it is sometimes appropriate to reduce the number of 4-way intersections, especially for busy roads. One way to do this is to rotate some parts of the grid through 90 degrees .



Some Blocks rotated to reduce 4 way intersections

To respond to topography

Topography is often the driver of street layouts and will always have some significance. Grid patterns may be distorted because of the constraints imposed by slopes. However, the need for a connected grid-based network remains, and grid blocks should still conform to a maximum walkable perimeter (as specified in the Reconfiguring a lot code).

[will be completed after scheme adoption]

Reconfiguration Code	
Zone	**PO**
Coastal	
Suburban	
Next Gen	
Urban	
Transition	25

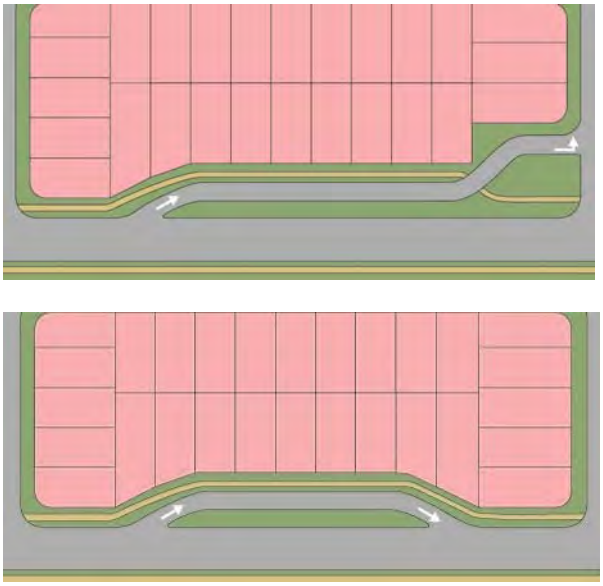
Grid Orientation to suit topography

9 Limited Access Streets

On local streets vehicle access will always be directly from the street. For arterials houses may back onto the street.

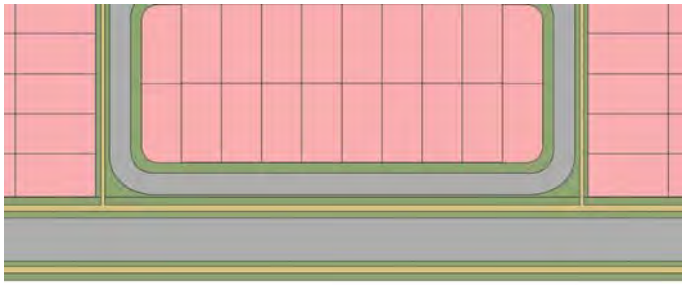
For collector roads and sub-arterials, some judgement is needed. Where direct access is not possible, the following may be used. The best result may be a combination of solutions along the length of the street:

All Zones & Precincts	**Refer to PSP Integrated Design Appendix 1**

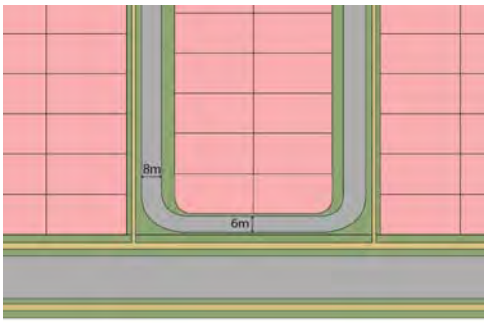


One-way service road

Use of a service road (North Lakes)

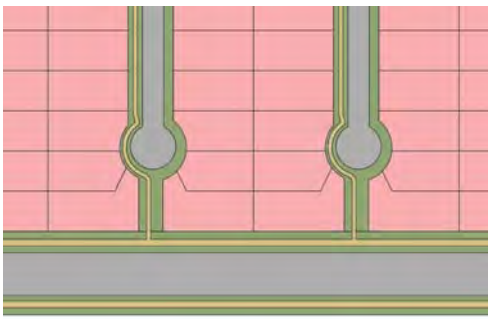


Service road from behind

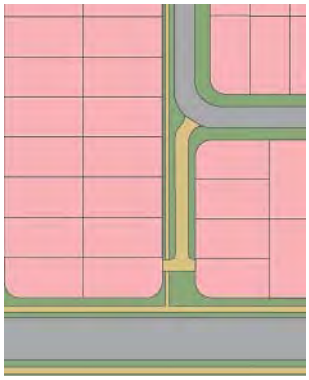


Local streets connected by laneway

Limited Access Streets (cont)

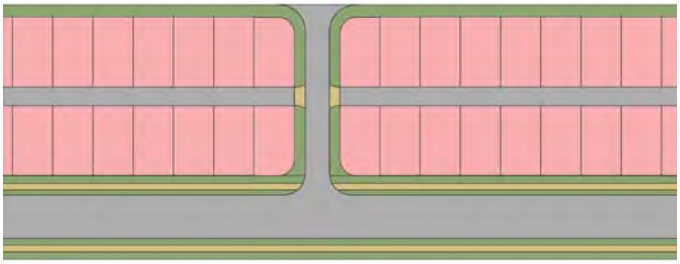


Cul-de-sacs with houses side onto the major road



Combined access and pedestrian / cycling connection

Combined access and walkway (Caloundra West)



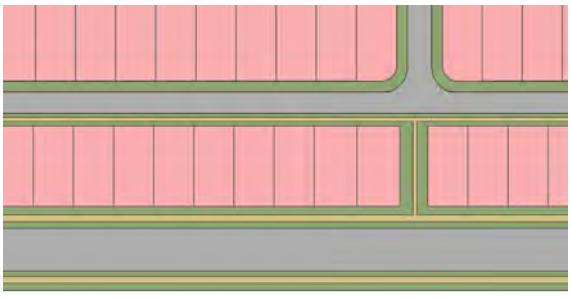
Rear Lanes

Rear Lanes next to a collector road (Fitzgibbon Chase)

Houses Backing on to Roads

Houses may back onto arterial roads but should not back onto collector roads or sub-arterials.

The use of transparent fencing is not appropriate mitigation next to busy streets as it compromises the privacy of residents and tends to be fenced



Arterial only—Backing onto road

Houses backing an arterial road with landscaping (Caboolture)

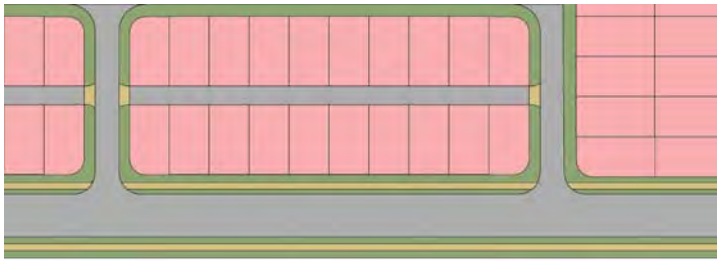
Use of Laneways

Rear lanes are useful to minimize the impact of driveways and vehicle access on the street where high density freehold lots are proposed.

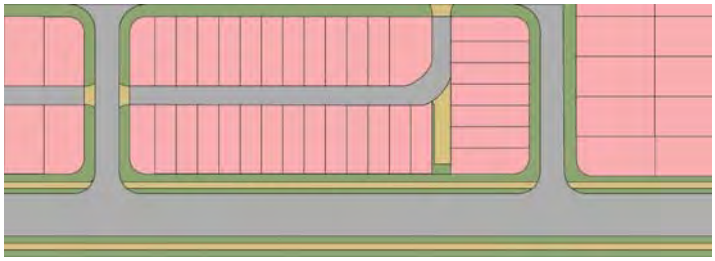
The provision of on-street parking at the front of the house is important where laneways are used. The rear lane should be easily accessible from the front of the house (access should not involve convoluted journeys).

In residential areas, laneways are a good solution in the following circumstances:

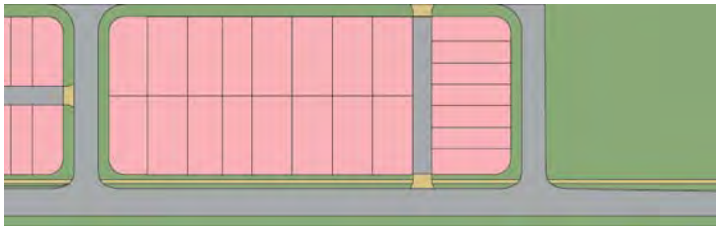
- As a way to avoid front access on limited access roads
- Where houses are opposite a local or district park



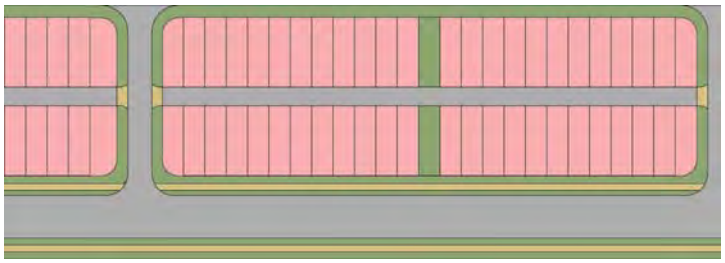
Straight Laneway



Curved laneway must allow for rubbish truck turning



Single sided block-end laneway



Longer laneways must allow pedestrian access mid-way

Laneway Design

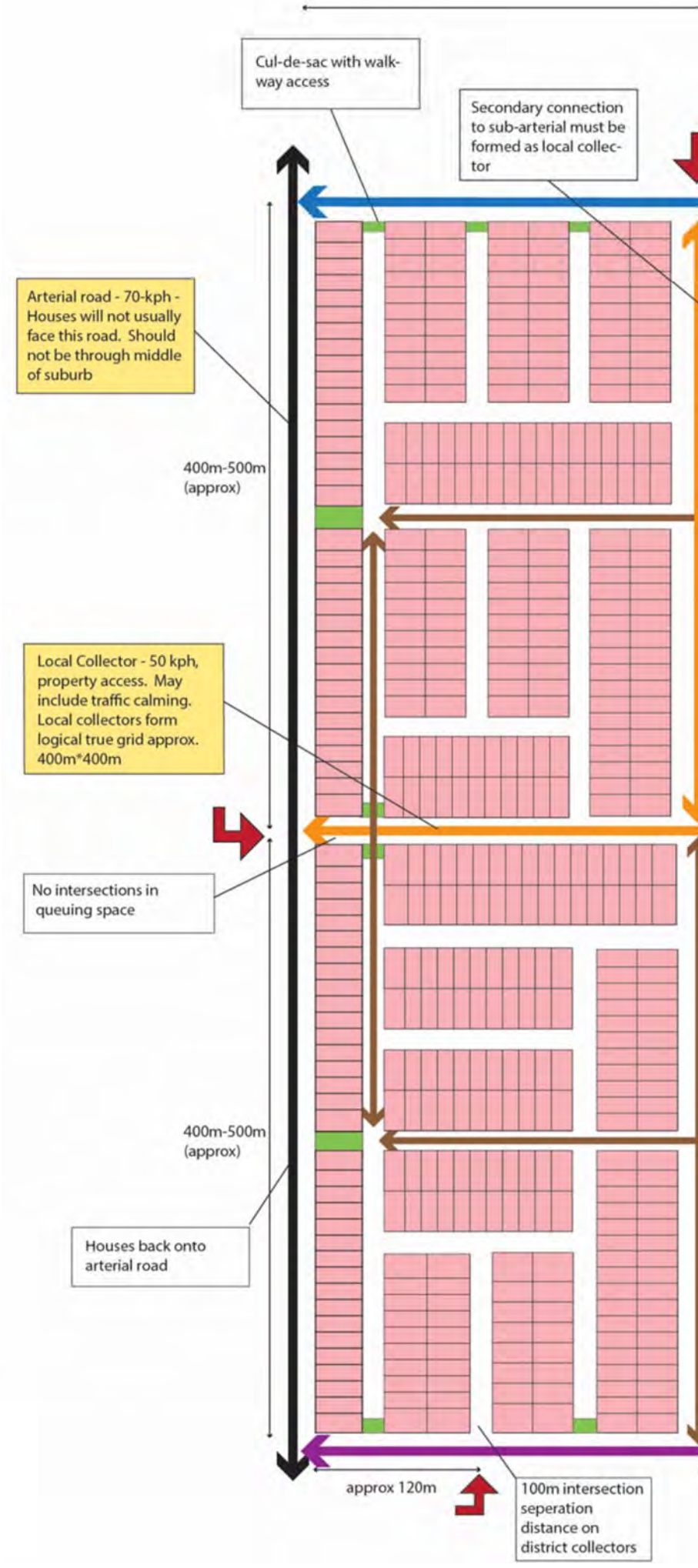
Reconfiguration Code	
Zone	**PO**
Coastal	
Suburban	
Next Gen	
Urban	
Transition	30, 31, 32

Laneway Houses (Front and Rear) (Fitzgibbon Chase)

10 Street Layout Design

The diagram opposite illustrates a connected street network designed in accordance with the Moreton Bay Regional Council Planning Scheme. The diagram is designed to show:

- How the different types of streets create logical connections through the neighbourhood
- The way lower order roads connect to the major road network.
- Options for fronting higher order roads with no direct road access



Reconfiguration Code	
Zone	**PO**
Coastal	
Suburban	
Next Gen	
Urban	
Transition	16, 22, 25, 30, 31, 32

[will be completed after scheme adoption]

- Highway
- Arterial
- Sub-Arterial
- District Collector
- Local Collector
- Local Access - implements connected grid of lower order roads
- Laneway
- Park
- Left in / left out

11 Open Spaces

Open spaces include Local, District and Regional Parks, linear parks, stormwater treatment areas and the Green Infrastructure Network. Together, these spaces contribute character, distinctiveness and natural beauty to a neighbourhood

11.1 Parks

In assessing the need for parks, the following needs to be considered:

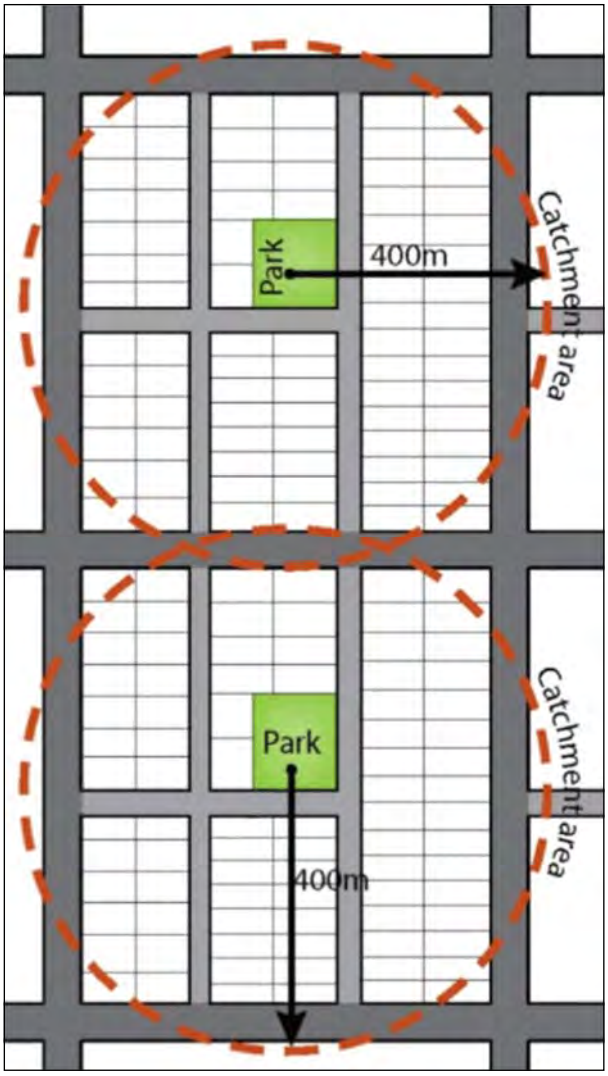
1 Future (forecast needs for open space).
2 Existing public space in and around the development area.
3 Any masterplanning or structure planning that has taken place for the area.
4 The need for linear parks or other connections.

Parks should be located to:

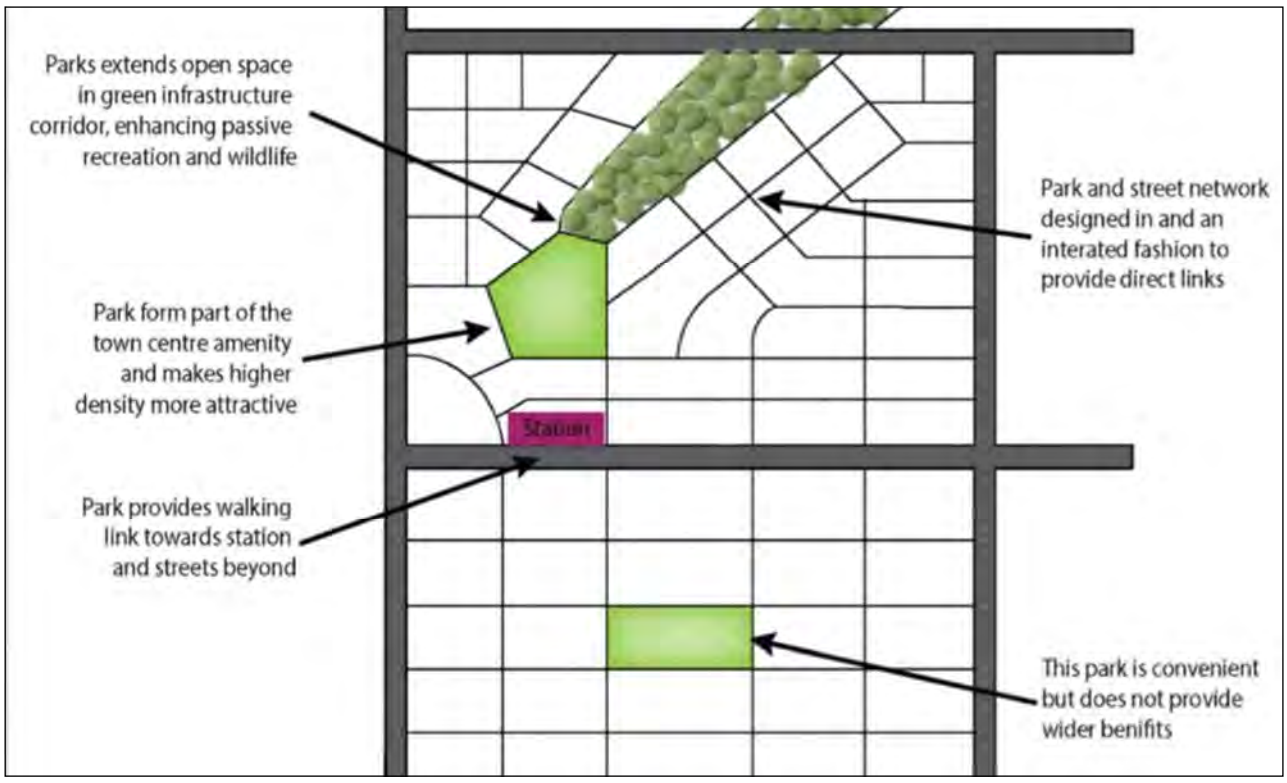
i. Maximise the number of people within a 5 minute walk (400metres) of a park

ii. Maximise the wider benefits of the park, including:

- Its position as a connection (a place people walk through on their way to a focal point).
- Co-location with adjoining stormwater management areas
- Retention of existing vegetation



Maximising the number of people within 400m of a park



Maximise the wider benefits of the park

iii. Take Advantage of Topography

In a subtropical climate, ridgelines and higher ground are the ideal location for pedestrian connections to take advantage of breezes and views.

iv. Be Overlooked by Windows and Built Frontage

Parks should be directly overlooked by houses or commercial / retail buildings over the majority of the perimeter of the park. This may be directly (eg where accessed by a rear lane) or across a street.

Reconfiguration Code	
Zone	**PO**
Coastal	
Suburban	
Next Gen	
Urban	
Transition	35, 36

[will be completed after scheme adoption]

v. Be Integrated with Centres

Where a neighbourhood includes a local centre, the centre should be integrated with open space if possible. The open space may take the form of:

a) A local park co-located with the centre

Where parks are co-located, the centre and park should function as a single destination by including the following elements:

- Integrated car parking that serves both destinations
- Commercial buildings face the park directly, possibly across a road

b) A civic plaza integrated with the centre

A civic plaza is a small, more formal public space integrated directly with a commercial development, usually in the form of a town square. The civic plaza will be designed at the time of the development to:

- Be faced by active frontage on at least one side (not across a road)
- Be located as an entrance feature, inviting people to walk through it on the way to the centre
- Be located adjacent to the main entrance to the shops
- Direct integration of facilities where possible (eg café seating spills out into the park and overlooks a playground)

A Highly visible park integrated with its surroundings (North Lakes)

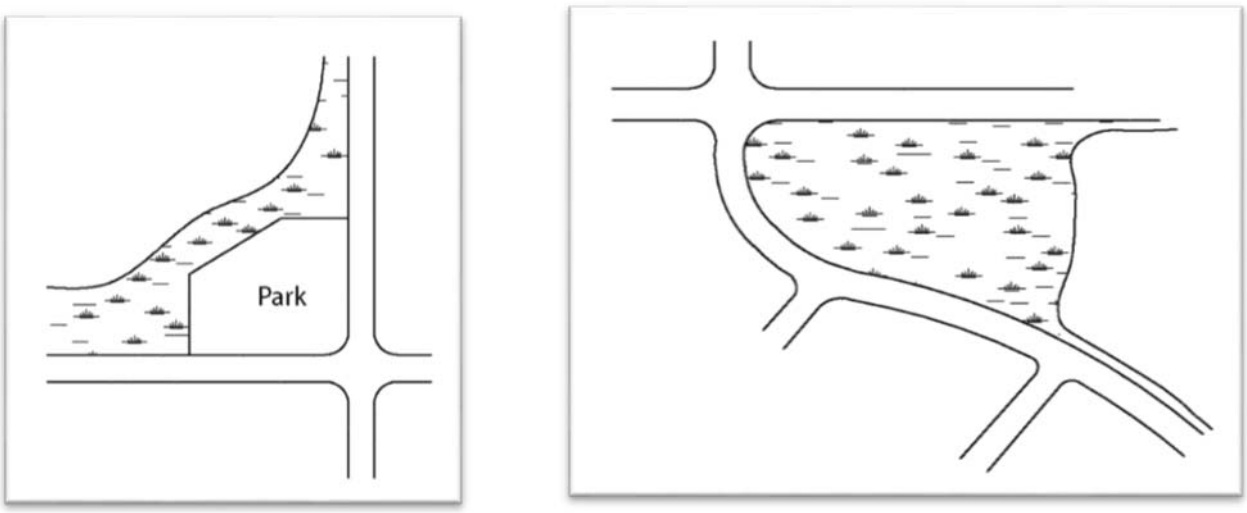
11.2 Stormwater

Reconfiguration Code	
Zone	**PO**
Coastal	
Suburban	
Next Gen	
Urban	
Transition	44

[will be completed after scheme adoption]

Locate stormwater management areas to increase the amount of open space in the development or to achieve ecological aims. Some ideas for achieving this are:

- As a feature next to a park, to create a larger open space:
- Integrated with the Green Infrastructure Network
- Raingardens and planted swales within the road corridor



Stormwater Locations

11.3 Green Infrastructure Network

Green infrastructure is a network of natural, semi-natural and engineered green assets that are functionally connected across a landscape. A green infrastructure network contains areas and corridors of natural bushland, parkland, street and habitat trees, urban landscaping, permeable paving and even innovative design technologies including green roofs and walls.

The Green Infrastructure Network is both a constraint and an opportunity. It should be considered at an early stage so that:

- the existing natural values of the site can be incorporated into the network.
- to maximise the amenity provided by the GIN.

The aim is to create a functional and connected network for wildlife movement. With this in mind, the design and layout of development should respond to the site. For instance roads may be positioned to incorporate existing trees into the road reserve

Forming a Connected Network

A connected network should be formed from existing and new elements. Green infrastructure elements such as street trees can be used to connect areas of natural bush.

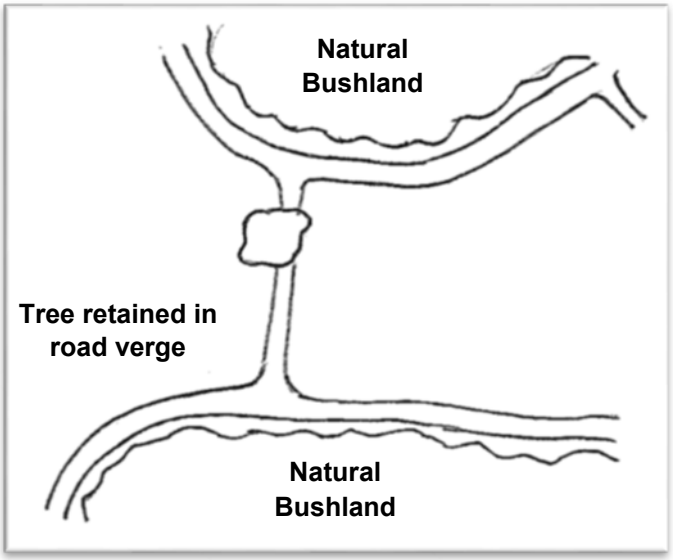
Local roads should be positioned at the edges of natural bushland areas to provide amenity to the neighbourhood. Locating parks next to the GIN will maximise the amenity benefits it provides and, if appropriate trees are planted in the park, improve the habitat for wildlife.

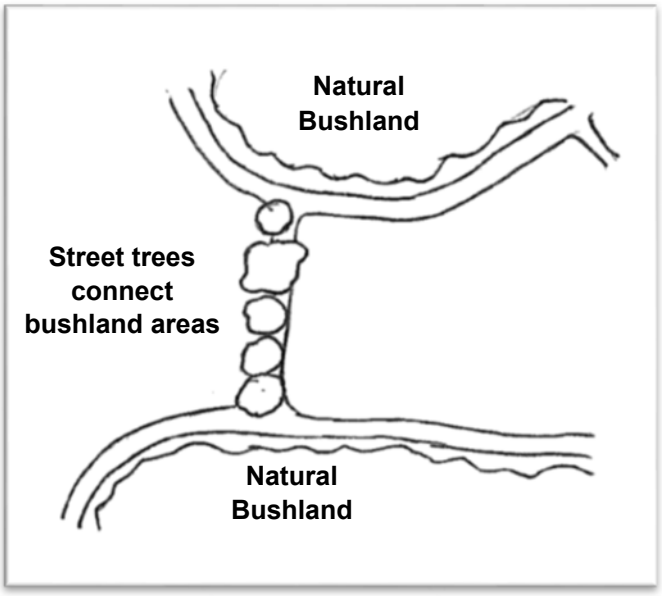
Where possible, major roads (i.e. District collector and above) should not be placed next to the GIN because of the danger they pose to wildlife

It will sometimes be necessary to connect roads through the GIN but these connections should not be too frequent. The use of wildlife movement infrastructure will sometimes be necessary, for instance to funnel wildlife movement under busier roads.

[will be completed after scheme adoption]

Reconfiguration Code	
Zone	**PO**
Coastal	
Suburban	
Next Gen	
Urban	
Transition	64





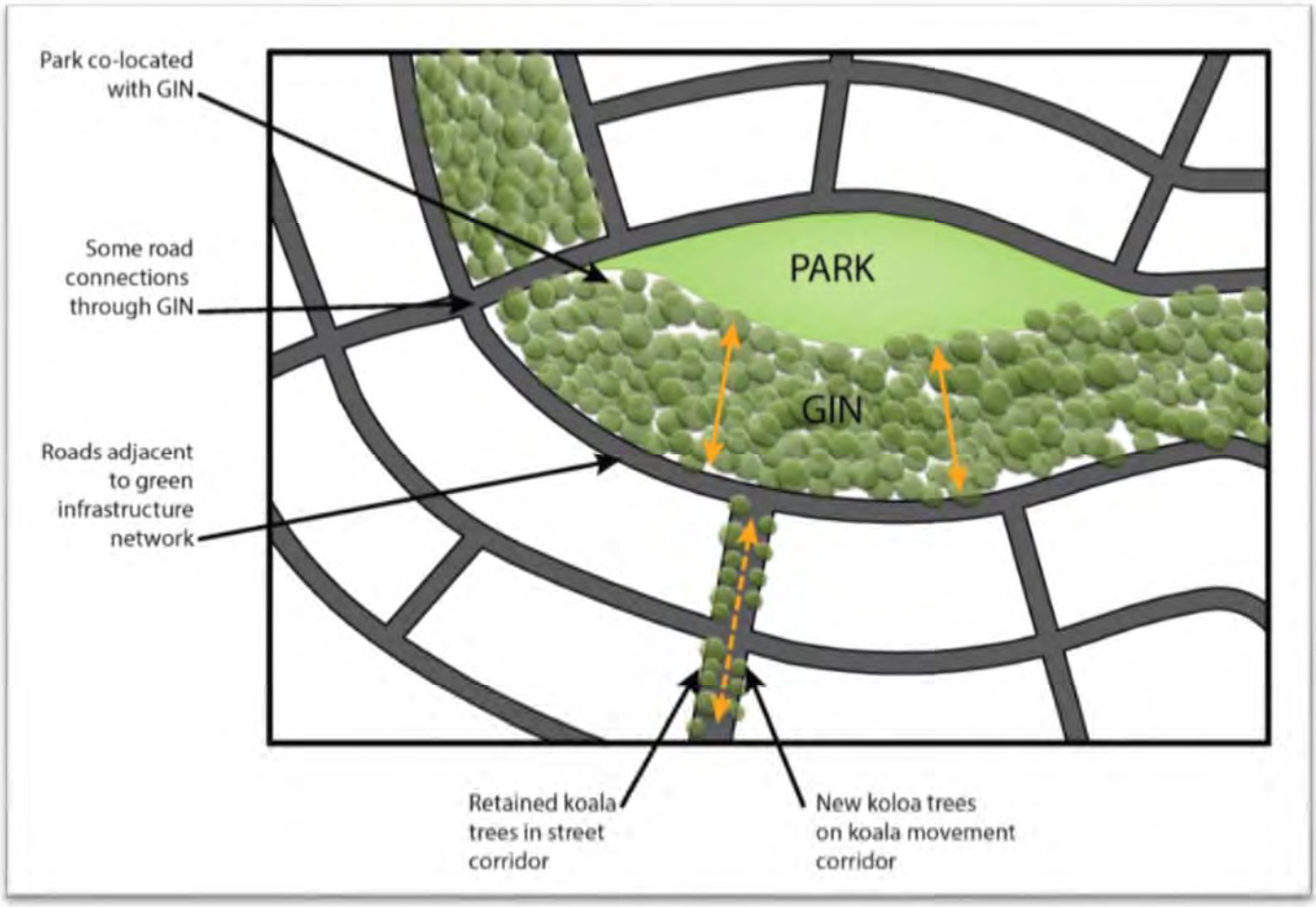
Connecting the Green Infrastructure Network

Green Infrastructure Network as Amenity Feature

Koala Movement

Where koalas and other wildlife are using trees in urban areas, neighbourhoods must be designed to retain and promote safe and ongoing koala movement and habitat values. Sometimes koala movement patterns can be incorporated into street networks to build safer road networks for wildlife.

Creating and retaining trees and linkages of native trees will assist koalas and other animals to move safely through the landscape. For example, scattered gum trees along road reserves, in civic spaces, open space parkland and drainage reserves promotes safe wildlife movement by providing 'stepping stone' food and habitat resources. Retained trees should be supplemented with new ones to create safe movement routes.



Koala Movement

12 Centres

New centres must be designed as part of the neighbourhood. This means that suitable land should be set aside at first design stage that can serve as an attractive, walkable focal point for the neighbourhood. A land parcel suitable for a centre should:

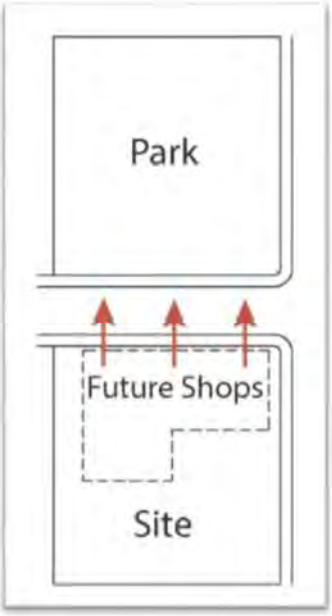
- Have dimensions that allow shops to face the street directly
- Be integrated with parks where possible
- Be located adjacent to busier streets
- Allow the provision of car parking and access in a way that is not dominant (usually it will be to the side and rear).
- Be accessible from all directions
- Take advantage of any other local opportunities, such as linear parks providing good walking access .

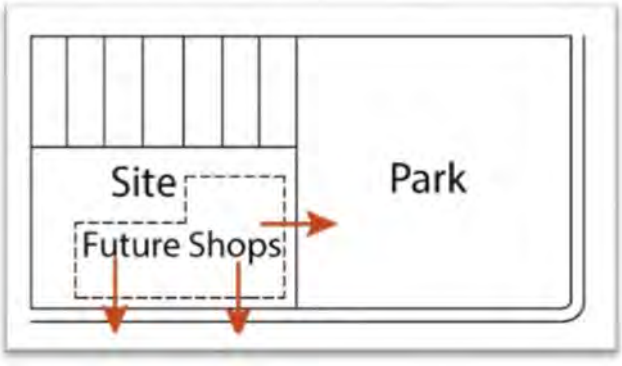
The surrounding area should be designed to allow access to the centre, especially on foot and by bicycle.

This could mean:

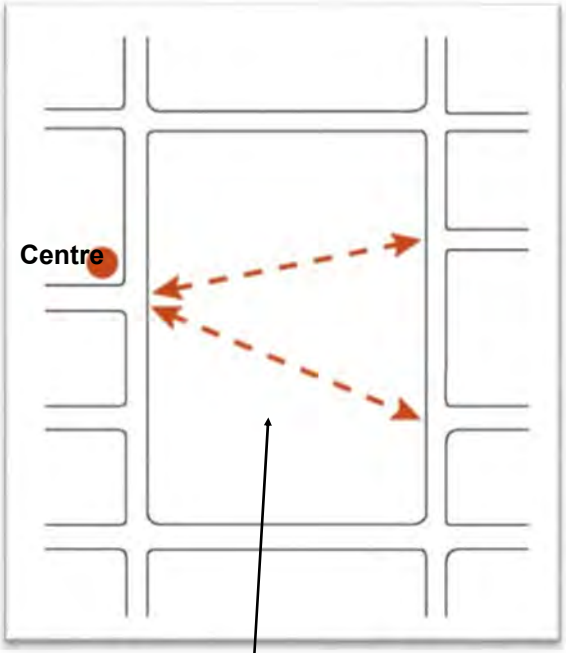
- Orienting streets to focus on the centre.
- Ensuring that walking routes to the centre are not blocked by earlier stages of development

Where there is an existing centre that would serve the development, consideration must be given to how it will be accessed from the area.

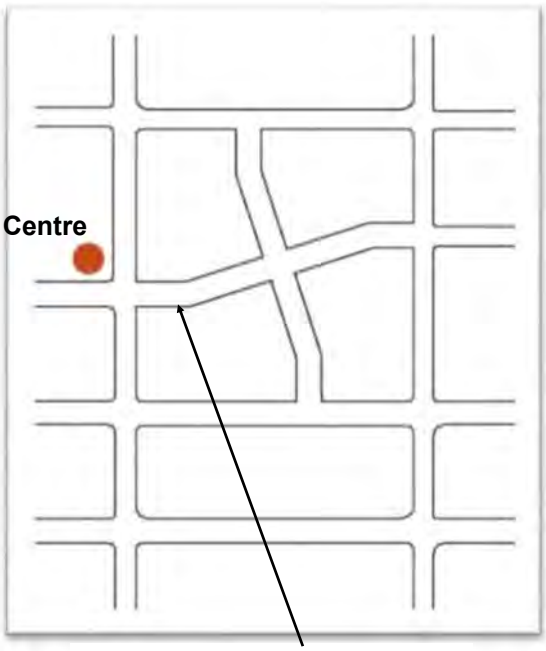




Examples of Commercial Sites co-located with parks



Desire lines cross the development site diagonally



Desire lines catered for in development

Desire lines and Accessibility

13 On-Street Parking

All Zones & Precincts	Refer to PSP Integrated Design Appendix 1

On Street Parking requirements are specified in the Works Code and Planning Scheme Policy — Integrated Design as follows:

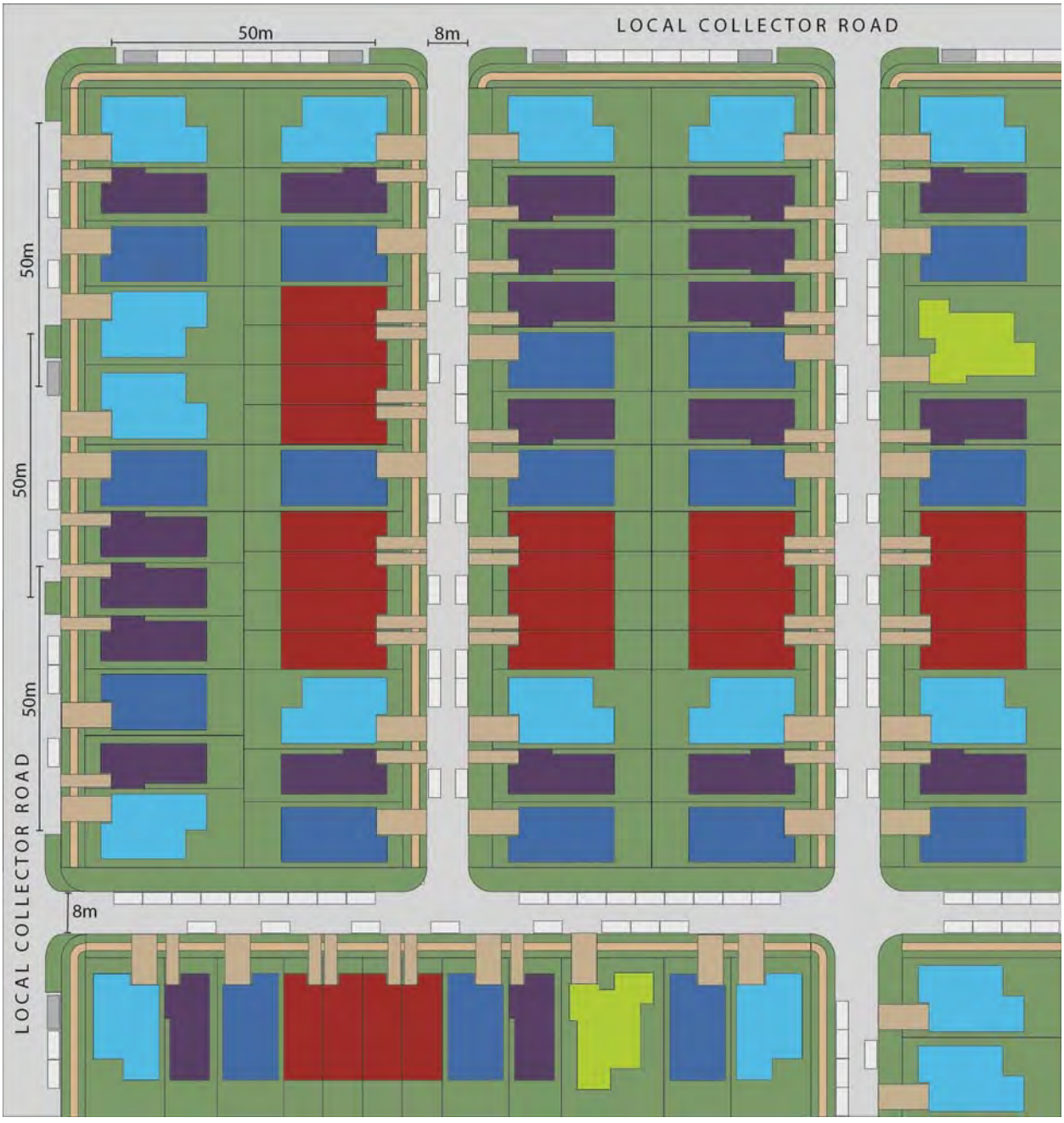
- Frontage of less than 12.5m: 0.5 spaces per lot
- Frontage of more than 12.5m: 1 space per lot

The examples below show how this is applied in the next generation and urban precincts.

Next Generation Precinct

The example below provides 107 on-street parking spaces. This easily meets the requirement for 51 spaces as shown in the table:

Lots	Lot Count	On-Street Parking Required
<12.5m Frontage	65	32.5
>12.5m	18	18
Total	83	51



Parking Diagram: Next Generation Precinct

Urban Precinct

This example has 86 on-street parking spaces for 92 lots and easily meets the requirement overall.

It is notable how much more parking is available in street A (with a rear lane—19 spaces) compared to street B (without—7 spaces)

Lots	Lot Count	On-Street Parking Required
<12.5m Frontage	89	44.5
>12.5m	3	3
Total	92	48

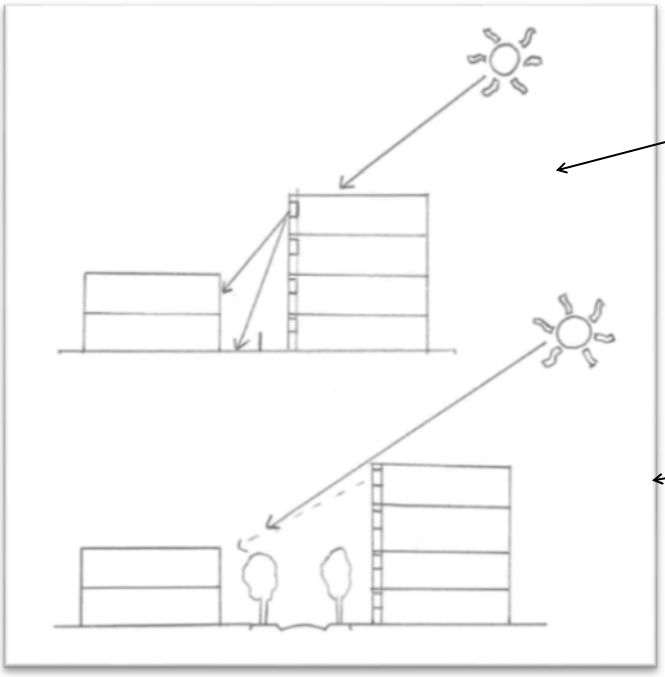
Parking Diagram: Urban Precinct

14 Transitions between Precincts and Zones

There are sometimes challenges in locating different activities or densities next to each other. This may include shops next to residential uses or the boundary between urban and next generation precincts.

14.1 Next Generation to Urban

Where Next Generation Precincts transition to urban precincts, or where there are adjacent sub-precincts with different height limits, the best place for the change in precincts is at the road frontage.



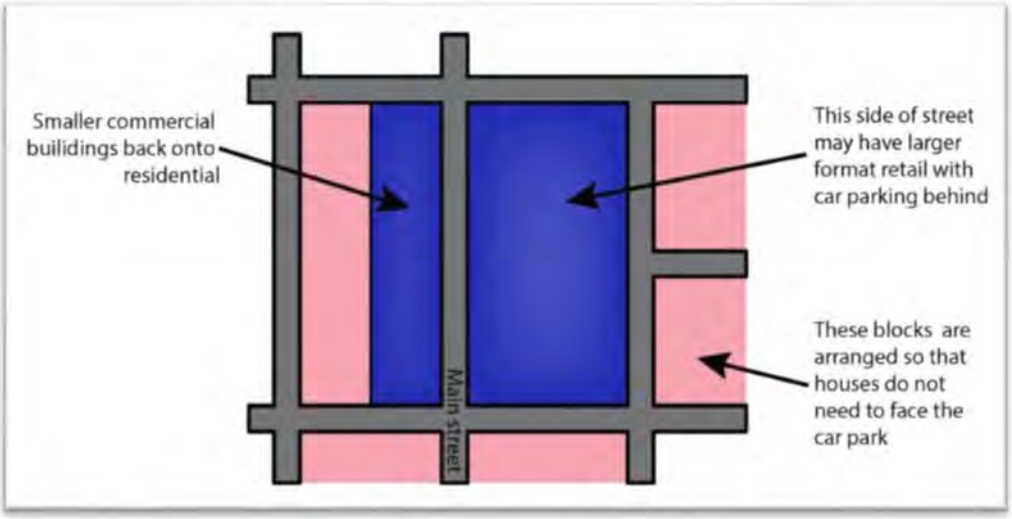
Overshadowing and overlooking of private space from taller buildings is not expected in precincts like Next Generation neighbourhoods.

In this example there is more separation between windows and balconies and private rear garden space is not overlooked.

14.2 Neighbourhood Hubs

Where there is a neighbourhood hub, the aim is to create an active retail presence. Designing a neighbourhood structure with a neighbourhood centre enclosed in a single block will usually mean that the .

back of shops (with servicing and bins) faces the street at the back. Often, the best outcome is to change the precinct within the block. This is especially true for small centres where deliveries are less intrusive



PART 3

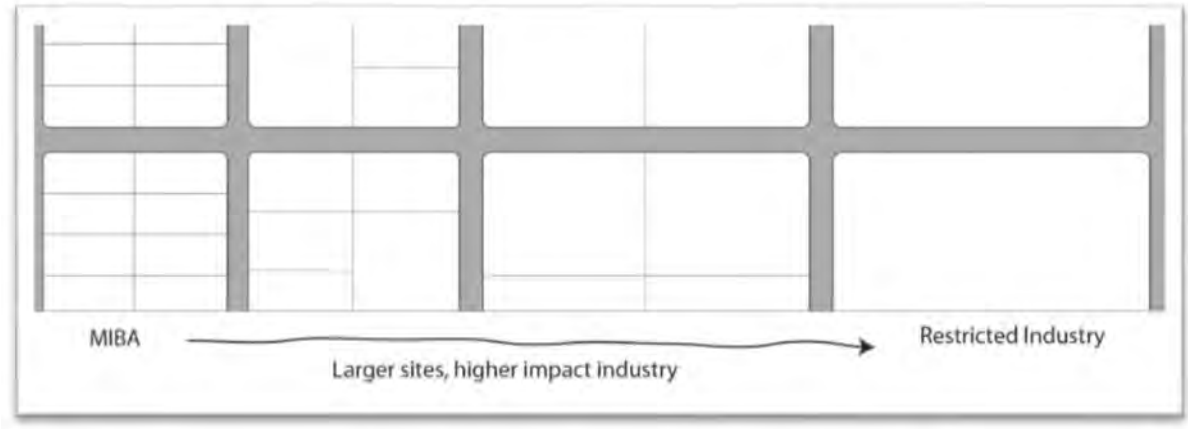
INDUSTRIAL AREAS

15 Enterprise and Employment Areas

15.1 Purpose and Character

This section refers to the Enterprise and Employment Place Types, including the Mixed Industry and Business Precinct as well as a variety of Industrial Zones from Light Industrial to Restricted. The purpose of the different precincts is summarised below:

Precinct	Purpose
Mixed Industrial and Business Area (MIBA)	Employment intensive, low impact industrial activities, with a high standard of visual amenity and high quality urban form. May include associated commercial activity.
Light Industrial Precinct	Low intensity and scale industry with limited off site impacts. May include industrial activities which generate visits from the general public. High standard of amenity.
General Industrial Precinct	Medium intensity and scale industry. Adverse impacts do not affect people outside the zone (or a zone buffer). Very limited non-industrial use.
Restricted Industrial Precinct	High impact industrial with adverse effects that must be separated from the rest of the urban area.
Marine Industrial Precinct	Port services, marine industry and related activities only.



Form and Function of Different Precincts in the Industrial Zone

Industrial areas have a different character to residential. There is still a need to move easily through them and they need to be pleasant places. However, depending on the type of industrial, there is a change in priority from a place that is attractive to one that is more functional. Through the different industrial precincts, with an increasing degree of industrial intensity, there is a change in emphasis from high amenity and high connectivity to larger sites, less connectivity and more functional design.

15.2 Location

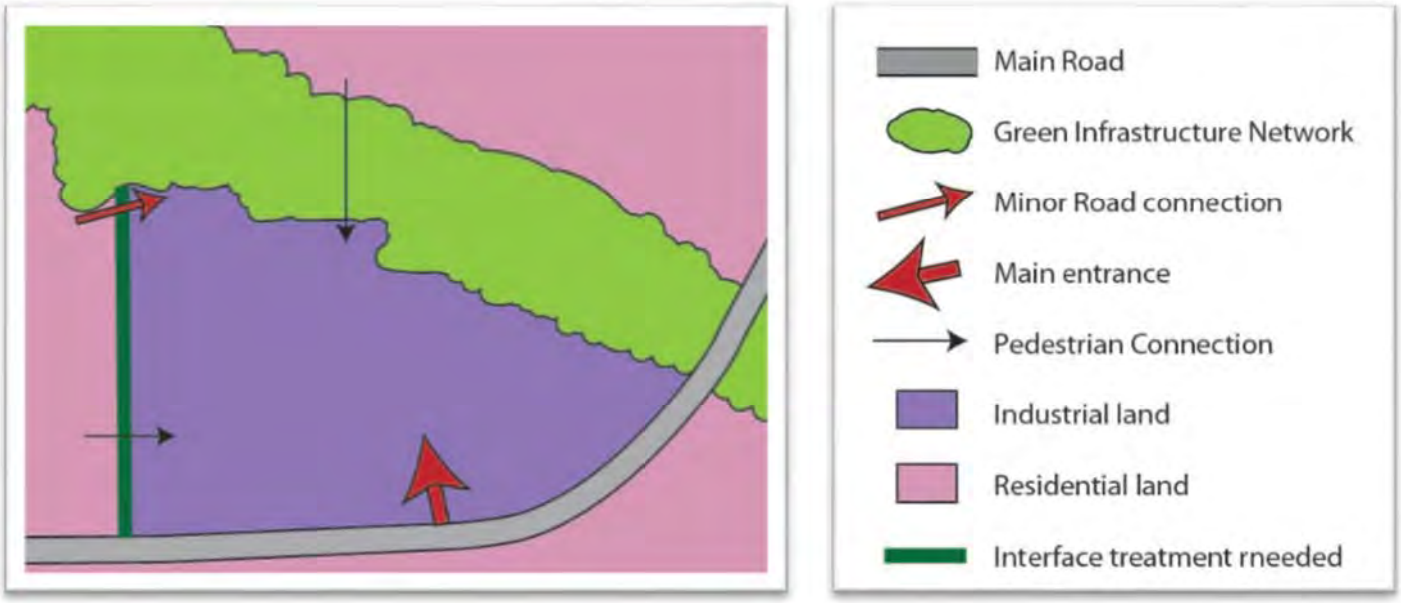
Industrial zones will be located on major transport corridors.

There will usually be some degree of separation between industrial areas and the rest of the urban area. The importance of this depends on the intensity of the industrial use. MIBA, Light and Marine Industrial areas may contain businesses open to the general public, attracting more visitors than other industrial precincts. These areas need to be accessible and well integrated into the urban structure.

General and Restricted Industry are for more specialised industrial uses with few casual visitors and the need for a high degree of accessibility is less.

There is a need to manage this balance between the area being accessible, and managing the adverse effects it may create, particularly heavy vehicle traffic. Main road access should not be through residential areas, but there may be local road access to MIBA and light industrial.

The best way to achieve separation is through the use of natural barriers like roads, drainage and the Green Infrastructure Network to create separation. Paths, either walking and cycling or access roads, can be provided where appropriate:



Relationship of Industrial Land to its surroundings

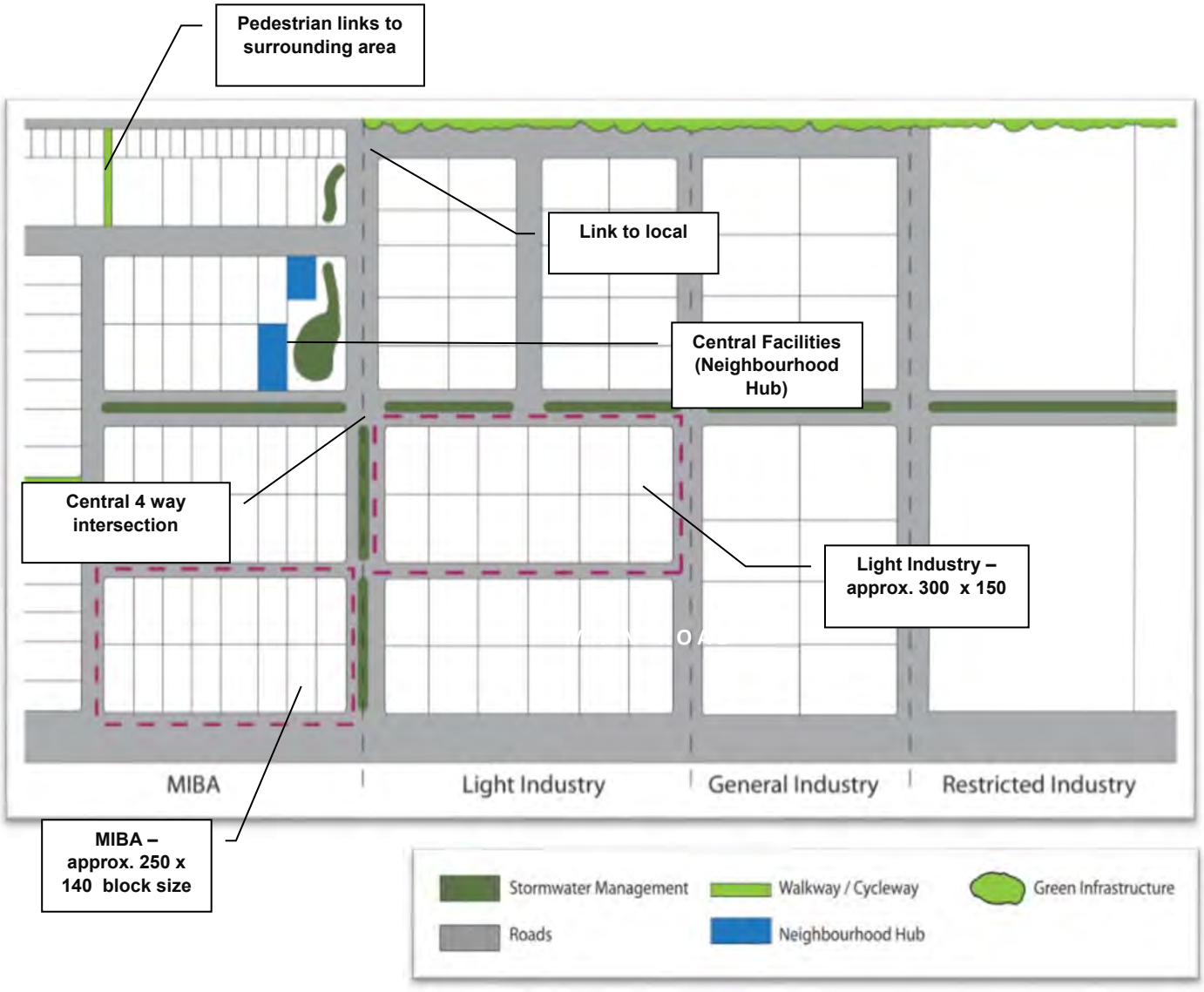
15.3 Structure

Industrial zones should be part of the urban structure. They will be permeable and connected. They will have local facilities (such as local shops and cafes) located centrally where they are accessible within the industrial area. These hubs will be co-located with open space on main routes through the area.

Like residential neighbourhoods, industrial areas will be built with a grid connected road network, so they are easy to navigate and can be accessed on foot or by means of active transport.

Using some 4-Way intersections helps to make a place navigable, especially if routes converge in a central place. This is often the best place for facilities like the neighbourhood hub.

Due to the scale of industrial activities and the lower intensity of use anticipated, the grid size expected is larger through the different types of industrial use.



Stucture of Industrial Areas

15.4 Movement

Walking and Cycling

Walking routes will be provided through industrial areas on the street network. The block structure of the network will ensure that there is good pedestrian access throughout. Blocks should not generally have a perimeter greater than 1km except for Restricted Industry.

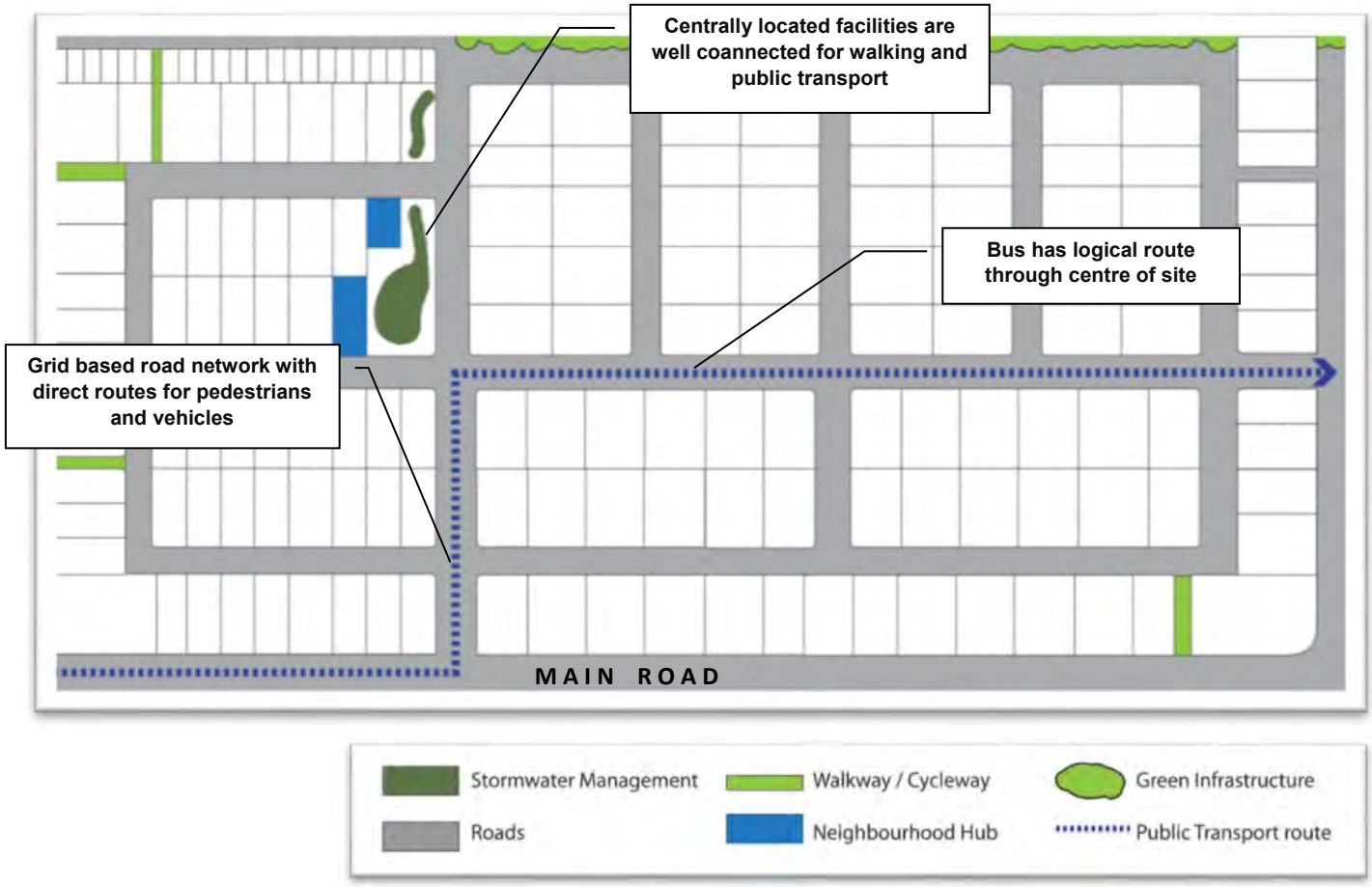
Street trees and landscaping within the street corridors will provide shade and amenity to make walking a viable option.

Public Transport

Public transport should be available within 400m of the majority of sites. This may be within adjacent roads, or on an internal road. Public transport should follow logical routes that are reasonably direct. Buses should not have to double back on themselves or follow convoluted paths.

Connections to main roads

All industrial areas should be directly connected to the main road network. There may be connections to the local road network – however these should not be more attractive for heavy vehicles than the route to the main road (for instance by connecting directly to an alternative main road).



15.5 Stormwater

Design and locate stormwater management areas to provide some amenity to the area. Planted stormwater areas with trees add interest to the area and reduce the dominance of hard-surface and large scale buildings.

Stormwater management may be on site or in dedicated areas. Either way, it should be open and planted to provide visual amenity. An integrated approach is preferred to site by site solutions. Multiple properties can be served by larger detention basins

Some areas may be suitable for raingardens and these are an opportunity to enhance the street amenity, especially in higher amenity industry areas such as MIBA.

Some ideas for the location of stormwater areas are:

- As a central feature or landmark at a prominent junction.
- Next to a road or walkway as a linear feature.
- Next to and integrated with the Green Infrastructure Network.
- Raingardens and planted swales in the road corridor (centrally located swales are preferred, especially in areas other than MIBA).

15.6 Open Space and Facilities

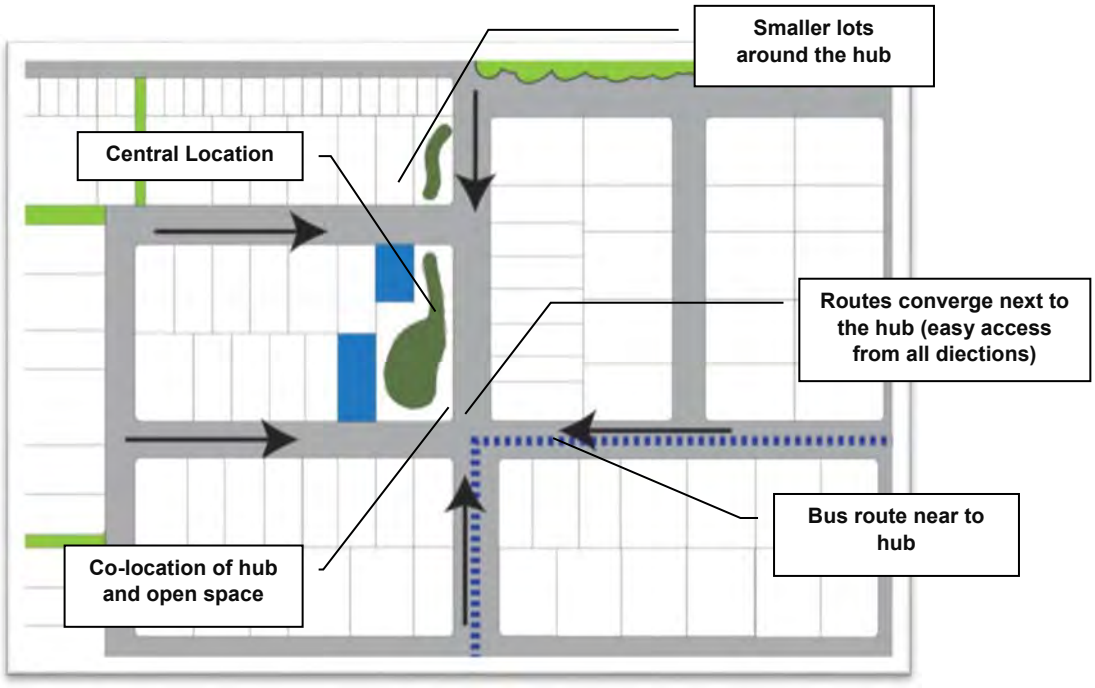
MIBA and Light Industrial areas will include local shops and facilities to serve the people who work in the area. These are known as neighbourhood hubs. They serve as focal points for the area and must be:

- Conveniently located for people within the area, easily accessible on foot from all directions and by public transport (if provided within the area).
- Located next to busier streets.
- High amenity areas, including some public space and taking advantage of opportunities to improve amenity such as stormwater corridors or remnant vegetation.

Suitable land for a neighbourhood hub should be set aside at the design stage.

The surrounding area should be designed to allow access to the centre especially on foot or by bicycle. This could mean:

- Orienting streets to focus on the centre.
- Ensuring walking routes to the centre are not blocked by earlier stages of development.
- Locating smaller blocks and smaller development parcels around the centre.



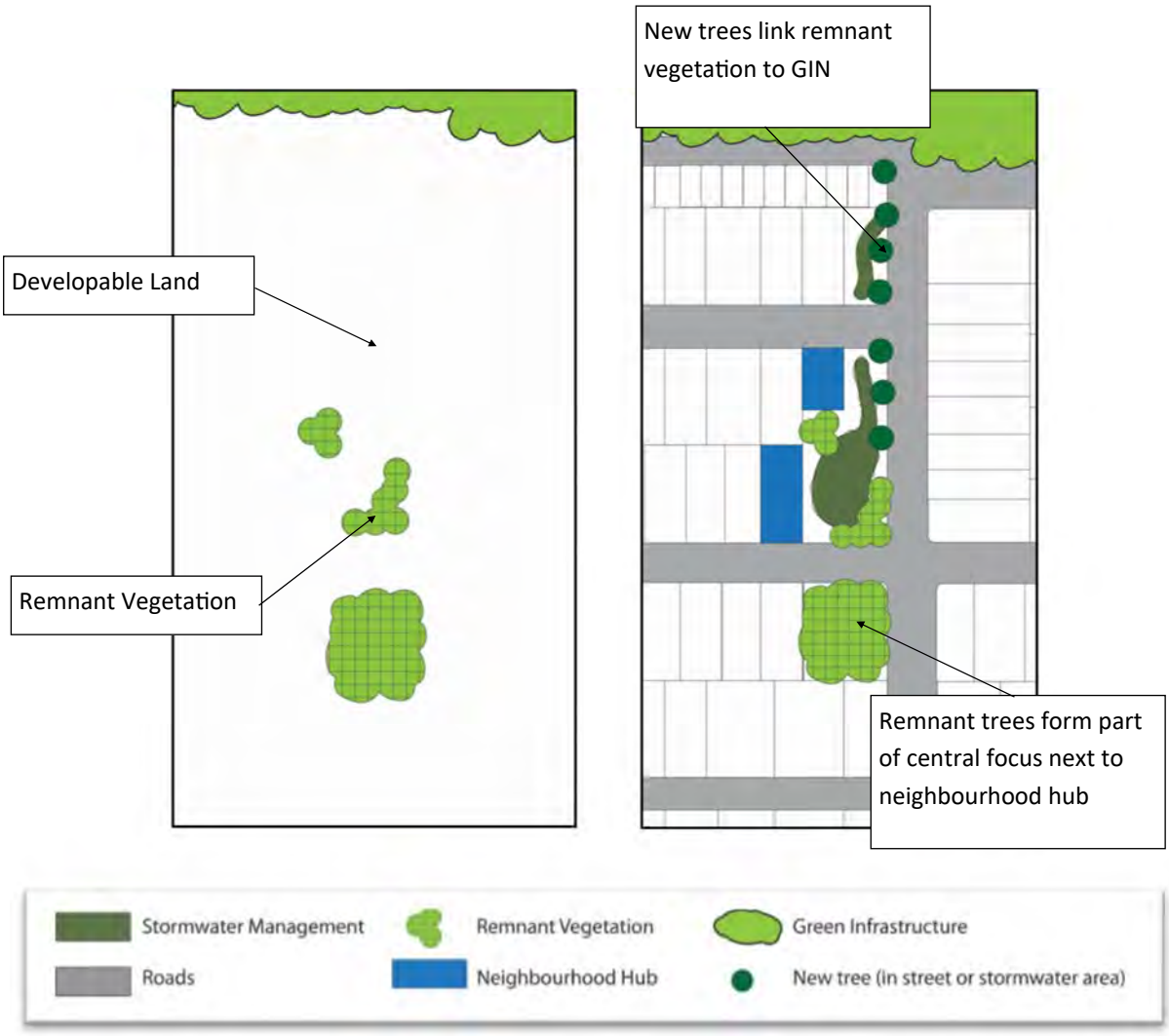
Stucture of Industrial Areas

15.7 Retention of High Value Vegetation

High value vegetation must be retained and integrated into the design of the development. Keeping this vegetation will make the area more attractive and distinctive as well as maintaining ecosystem services. It will also provide shade and assist in stormwater management.

Retained vegetation should be incorporated into the public realm, for example co-located with stormwater management or road corridors.

The development should also connect the retained vegetation to any surrounding vegetation through the use of green corridors where possible, to allow wildlife to reach it. This can be achieved through the planting of suitable street trees or trees within stormwater management areas.



Designing for Remnant Vegetation and Wildlife

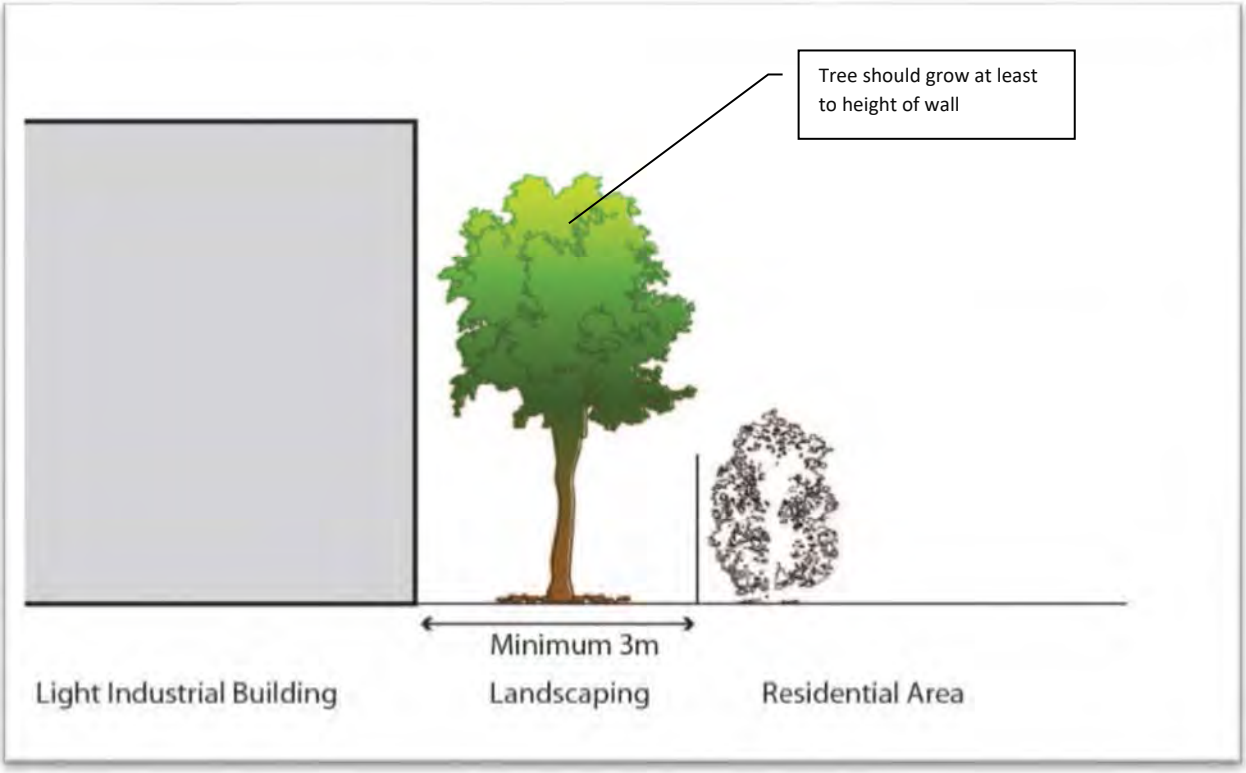
15.8 Transitions to Other Zones

Industrial zones generate adverse environmental impacts which can affect land and people around them. The transition to neighbouring areas must be considered carefully.

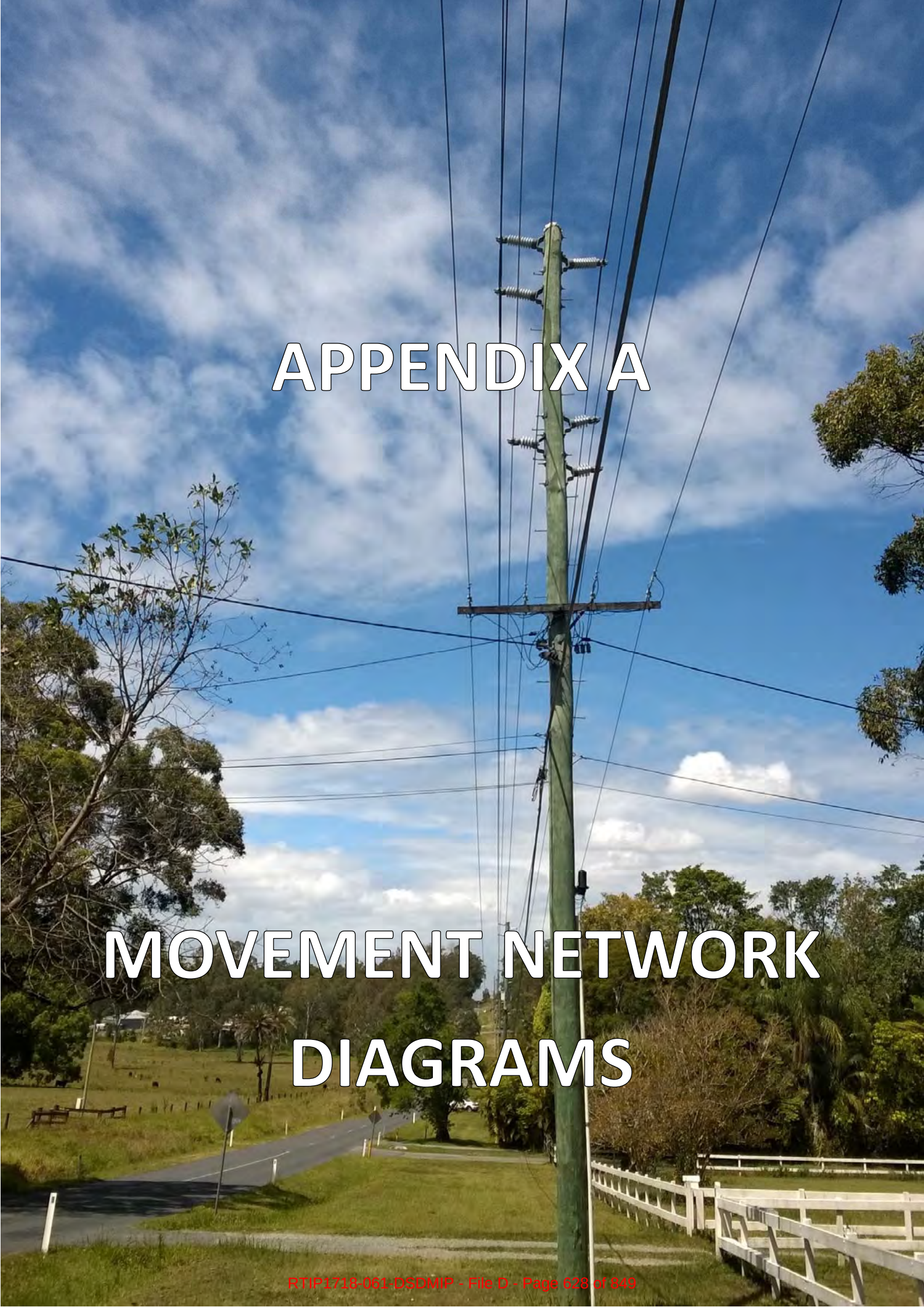
The best transition is where there is a natural barrier such as a main road or stormwater or environmental corridor. This manages the effects by providing a degree of separation.

The need for separation is not so great for MIBA and light industrial areas that create fewer of these effects and can provide a location for goods and services used by people from the nearby towns. Where there is a boundary between these precincts and other urban area zones it should be managed by:

- Reducing the scale of buildings near the zone boundary, possibly by placing smaller lots in this area.
- A degree of separation so the dominance of blank walls and large scale buildings is reduced.
- Planting trees and bushy shrubs within the separation area.



Transition from MIBA / Light Industrial to other zones



APPENDIX A

MOVEMENT NETWORK DIAGRAMS

Introduction

Movement Network Diagrams are intended to ensure key connections are provided when land is developed, either through reconfiguration of a lot or through material change of use.

The diagrams in this section show Council's preferred location for connections.

List of Diagrams

Legend

Diagrams in this section use this legend
Except where otherwise indicated

Movement Network Diagrams

Figure A1 Elimbah—Beerburrum Road

Figure A2 Bellmere—Guilford Court

Figure A3 Elimbah East

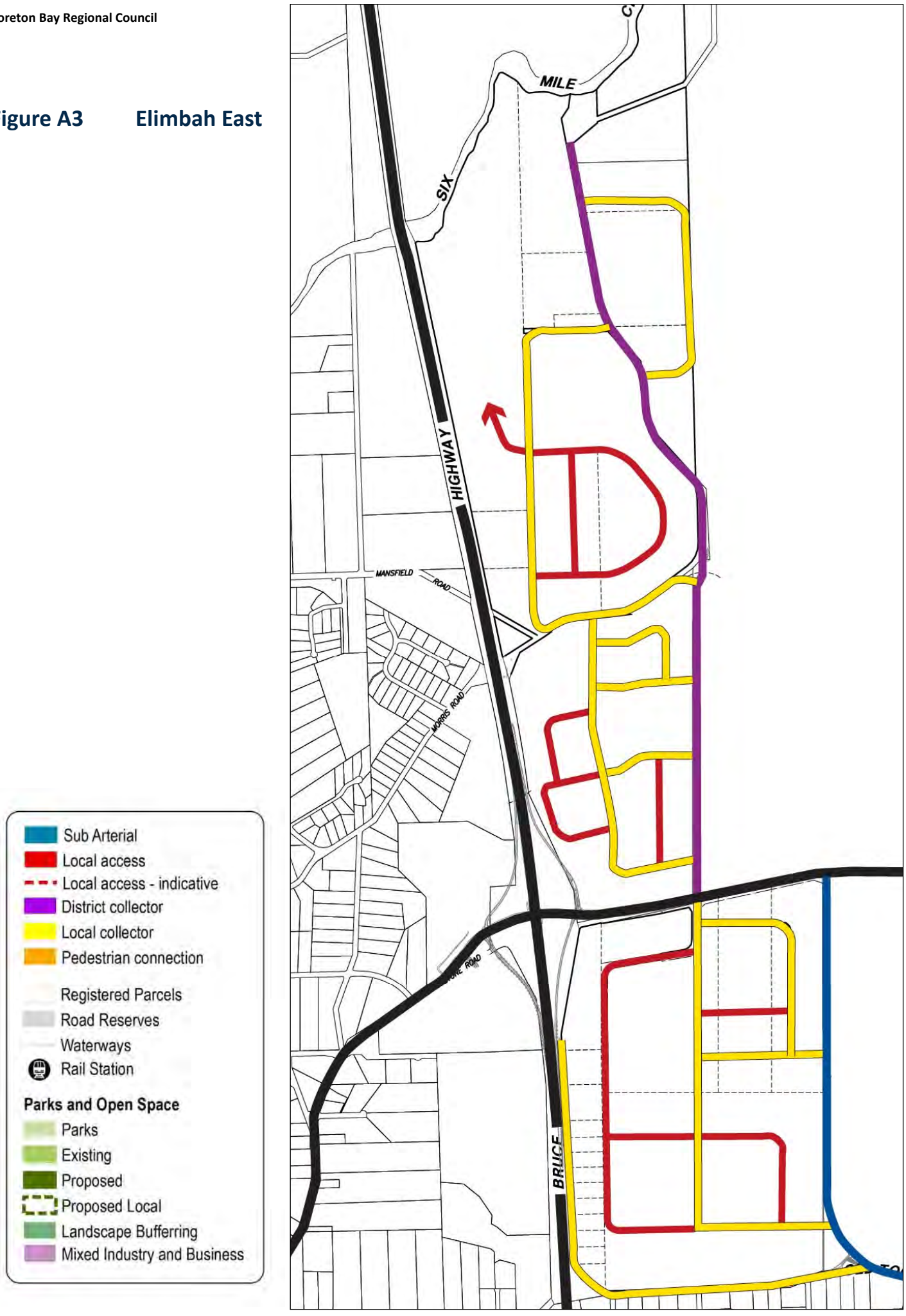


Figure A4 Caboolture—Pumicestone Road

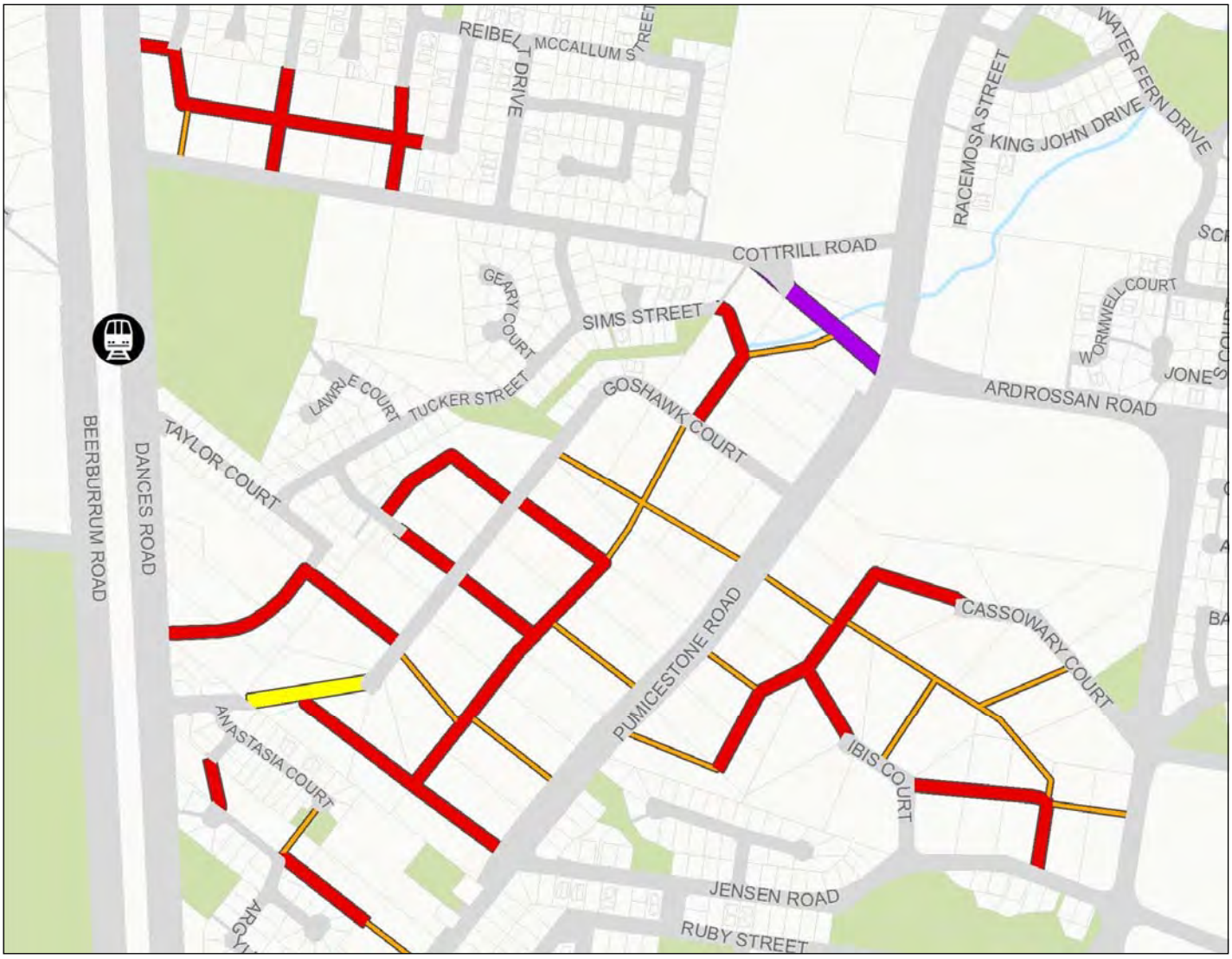


Figure A5 Caboolture— Smiths Road

Figure A6 Caboolture South — River Drive

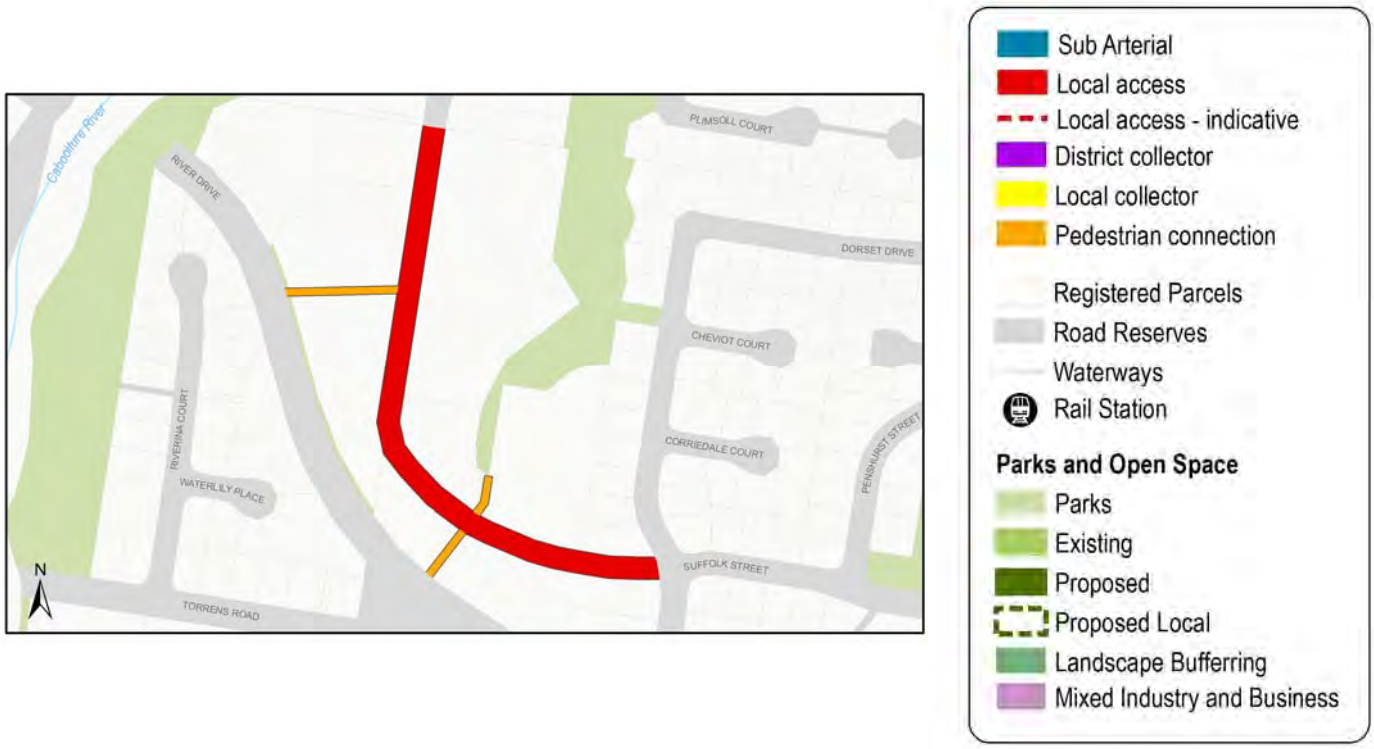


Figure A7 Morayfield—Visentin Road

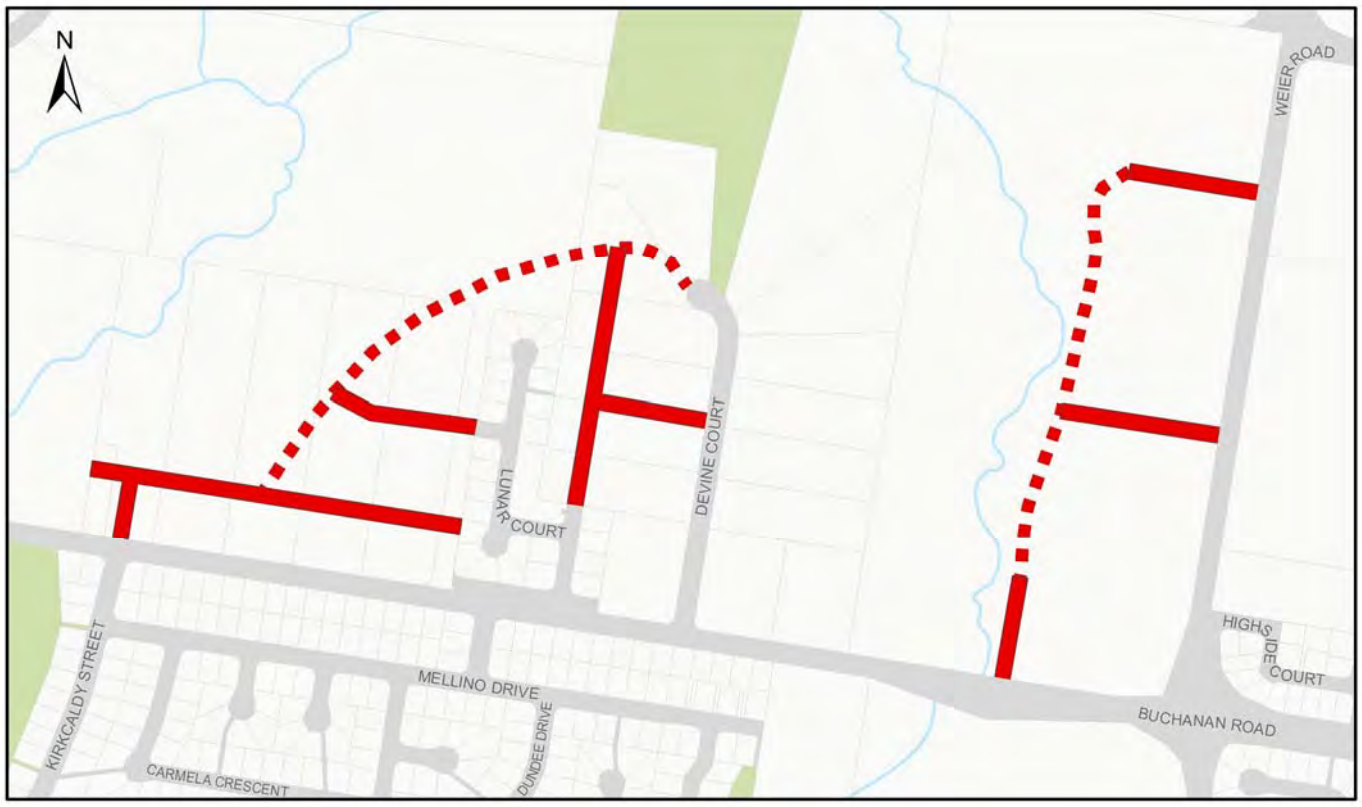


Figure A8 Morayfield — Caboolture River Road

Figure A9 Morayfield—Anderson Road

Figure A10 Morayfield South

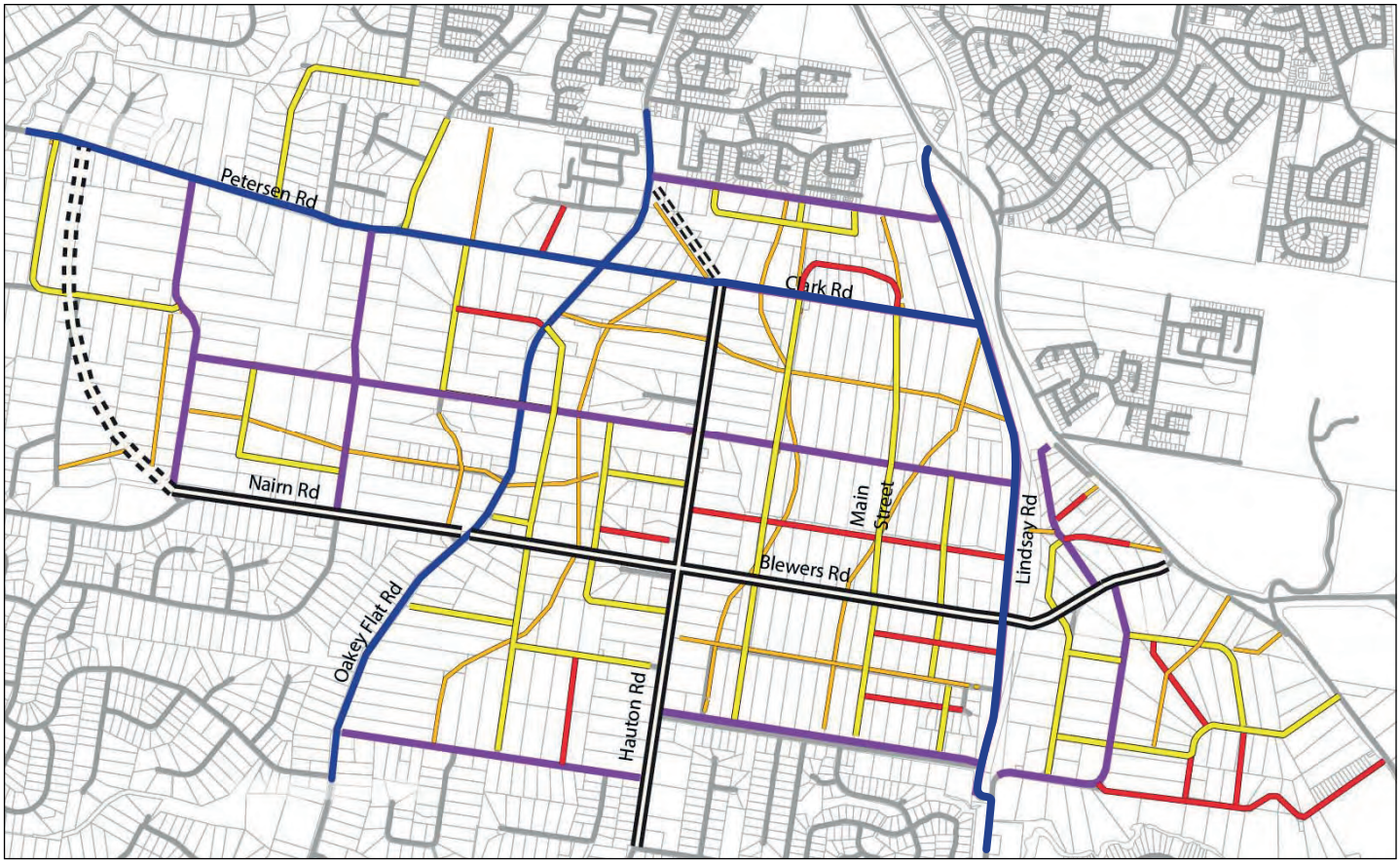


Figure A11 Deception Bay—Bailey Road / Park Road

Figure A12 Deception Bay—Deception Bay Road

Figure A13 Narangba—Young Road / Oakey Flat Road

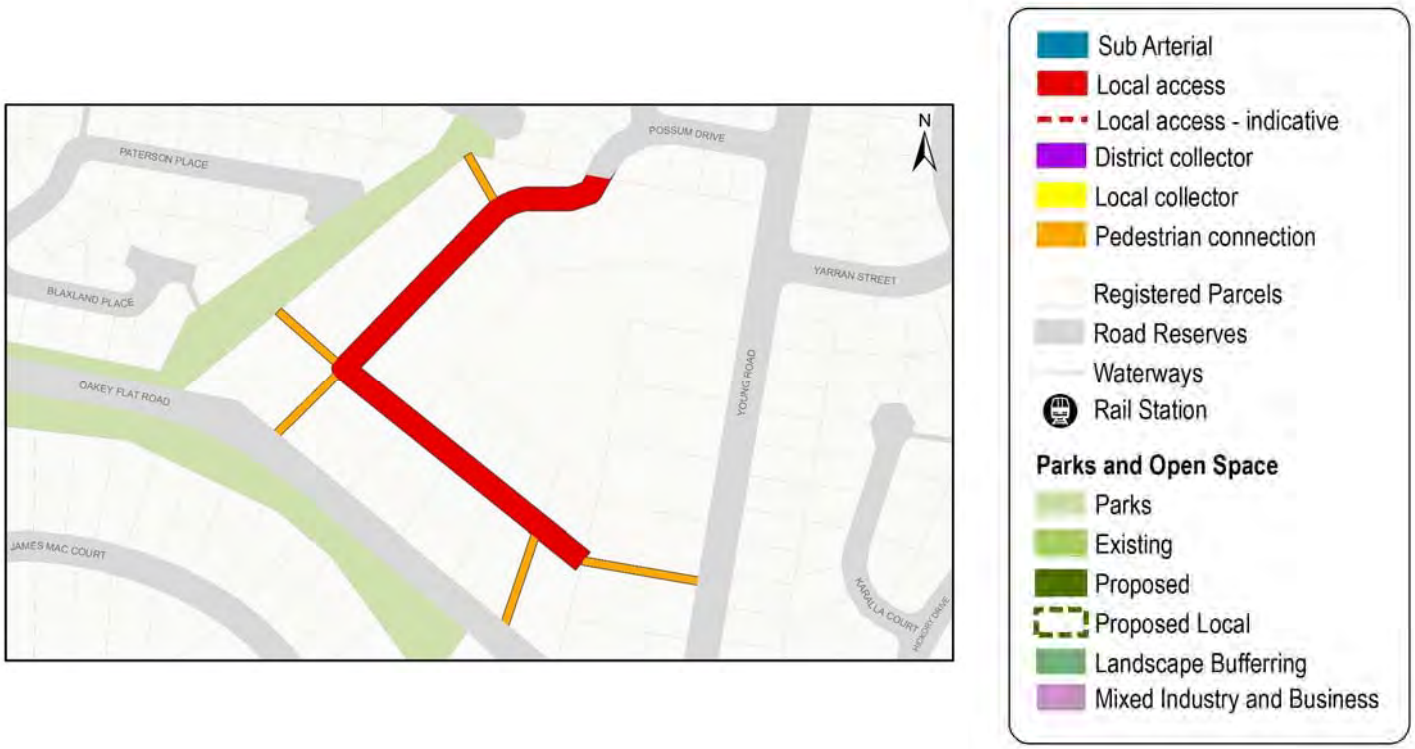


Figure A14 Dakabin

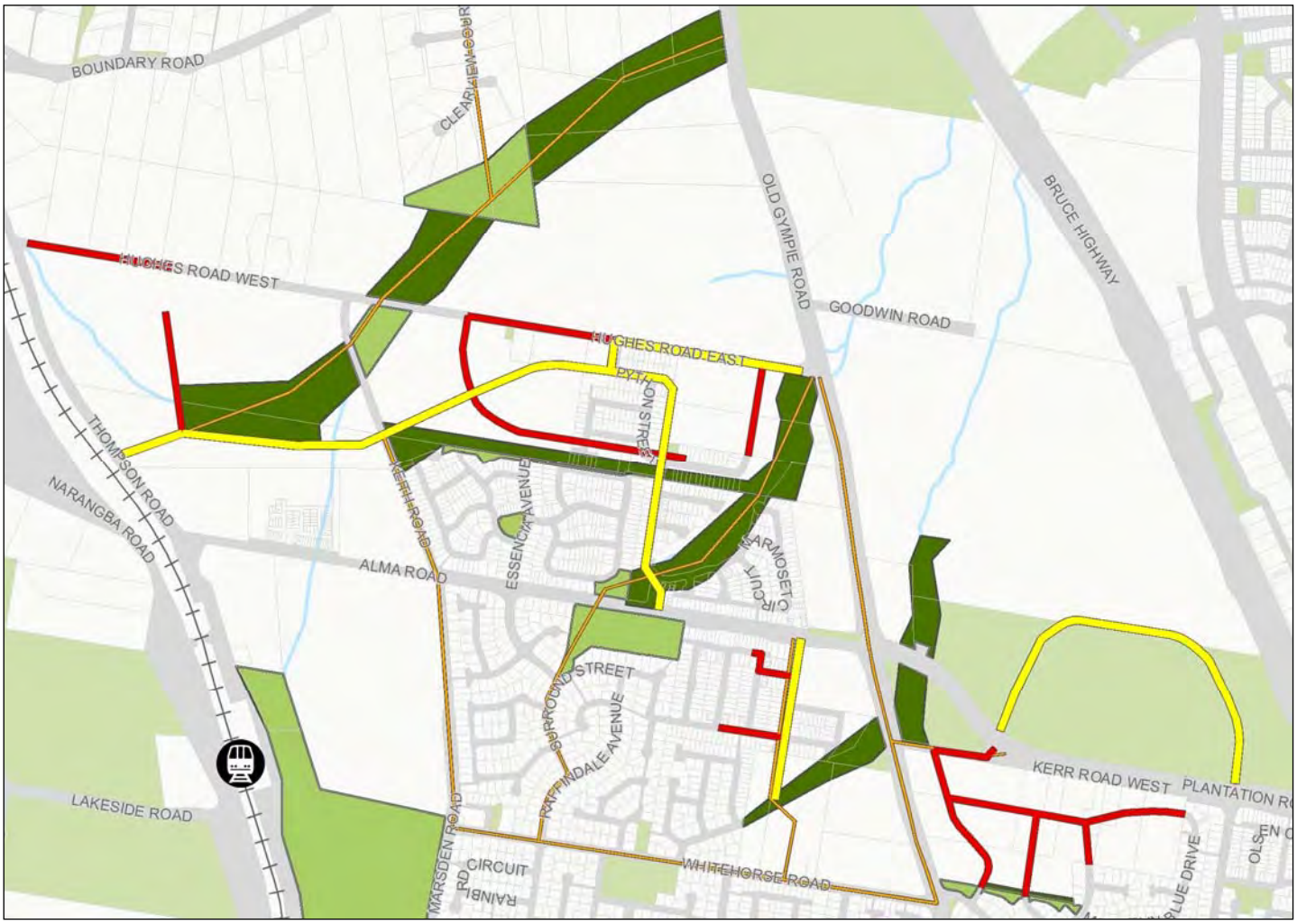


Figure A15 Narangba East

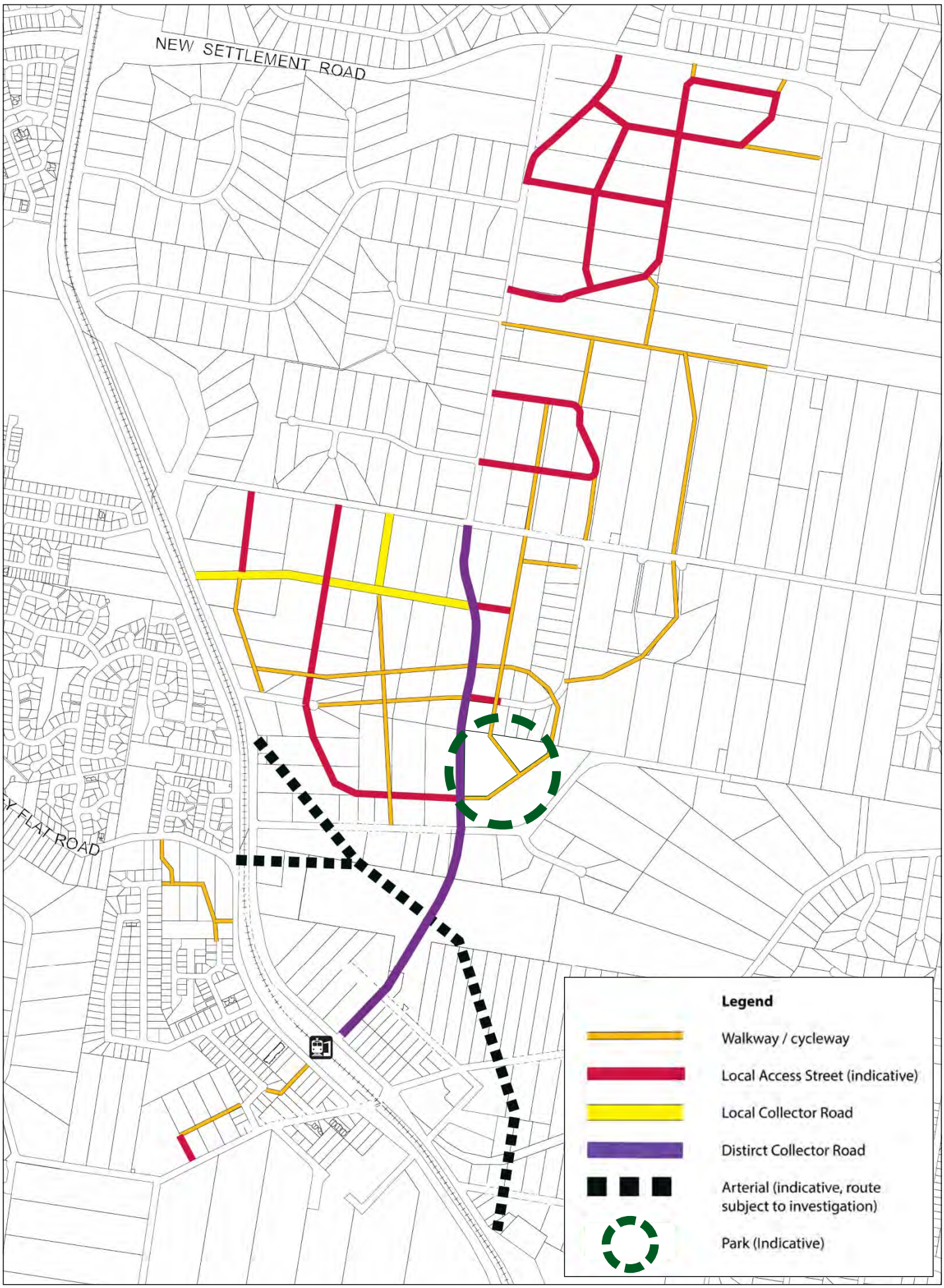
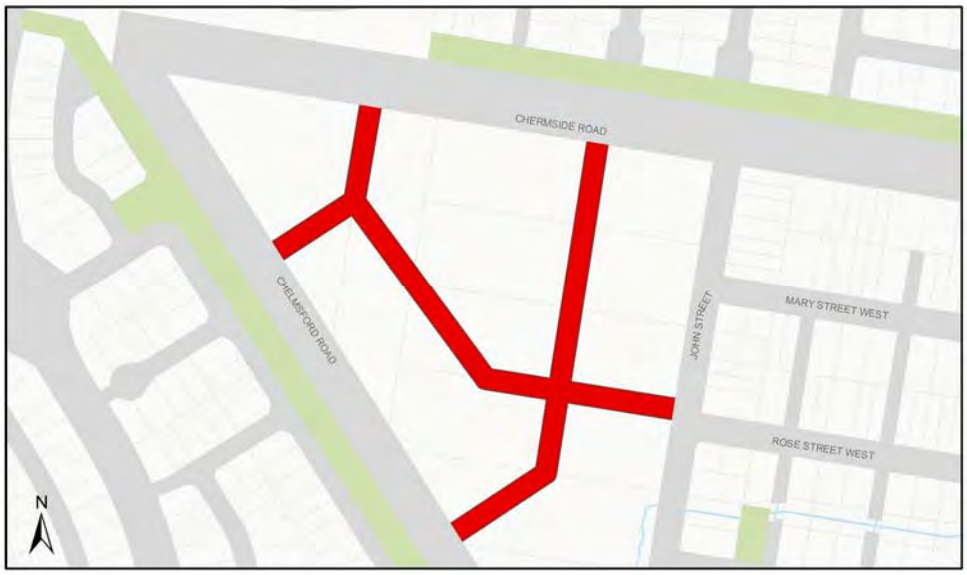


Figure A16 Mango Hill—John Street



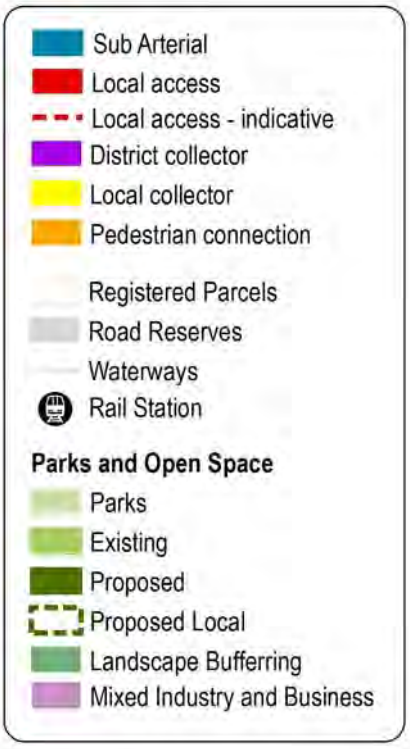


Figure A17 Mango Hill East

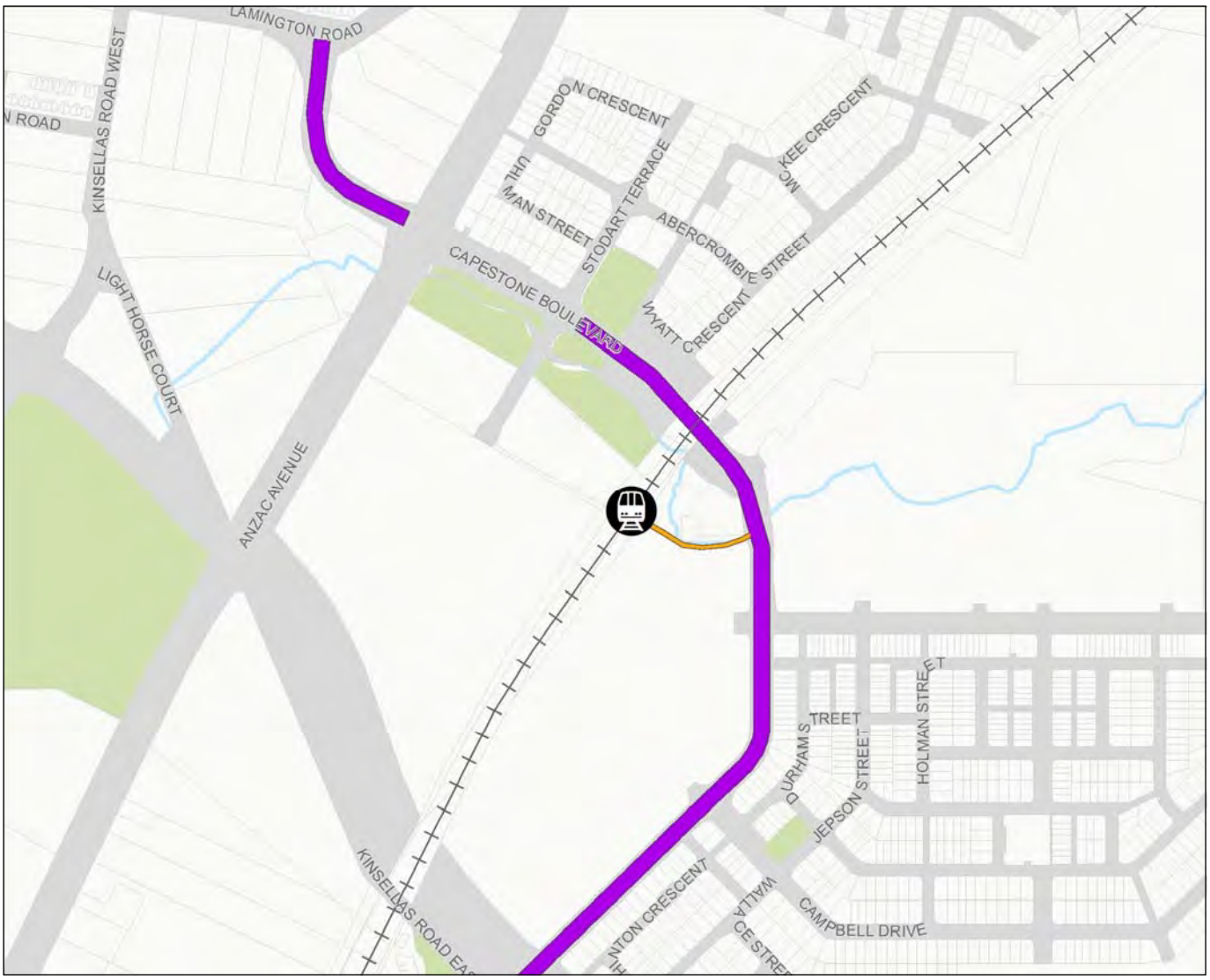


Figure A18 Mango Hill

Figure A19 Griffin

Figure A20 Kallangur

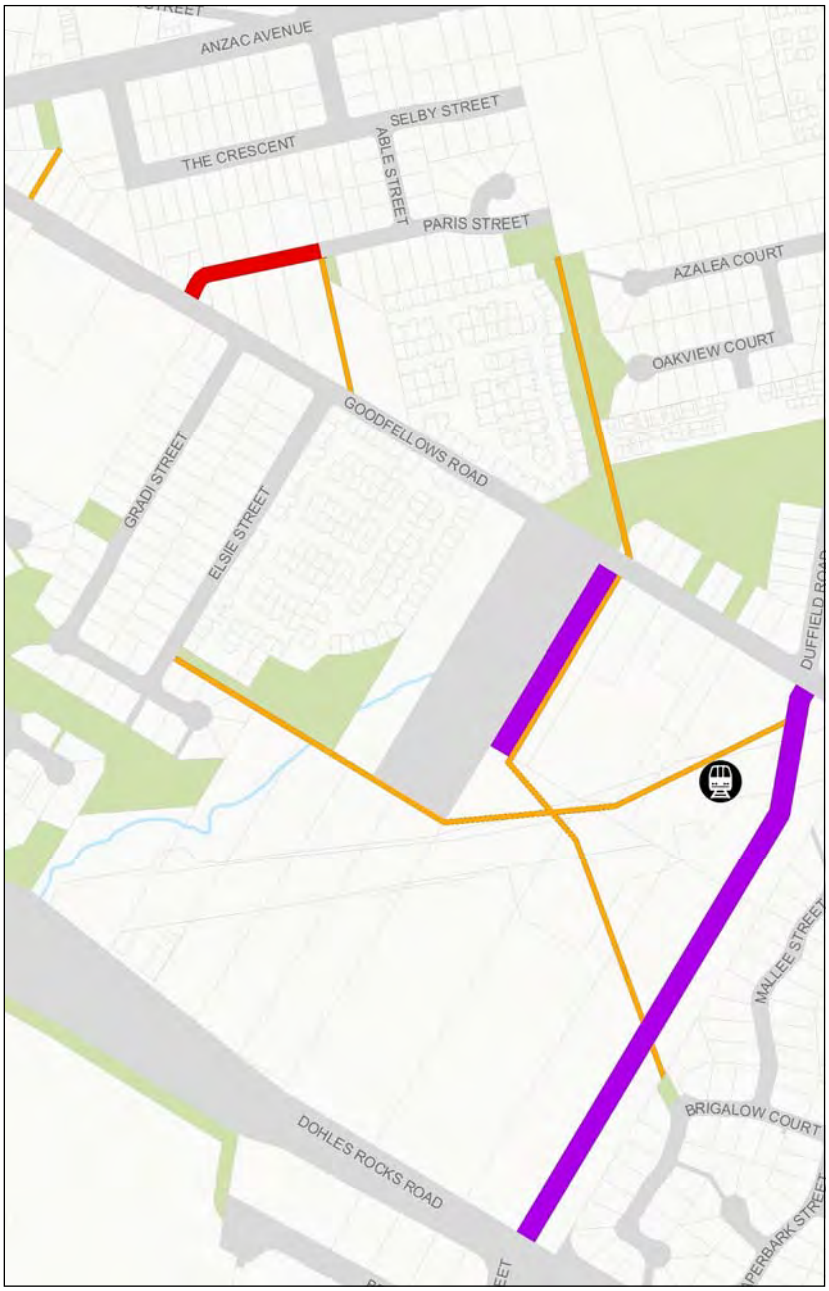


Figure A21 Petrie

Figure A22 Lawnton—Akers Road / Isis Road

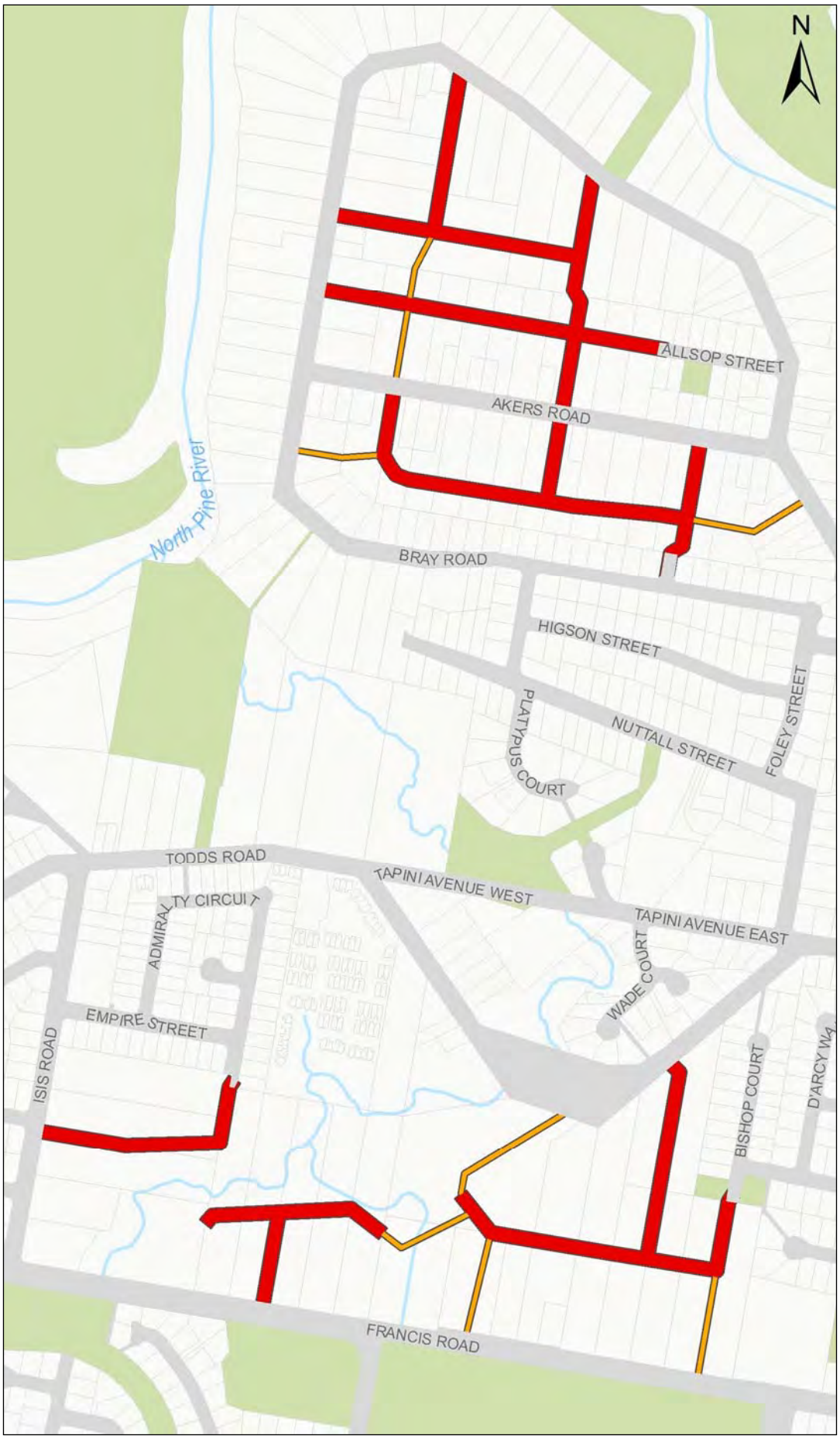


Figure A23 Bray Park—Samsonvale Road

Figure A24 Rothwell—Whitlock Drive

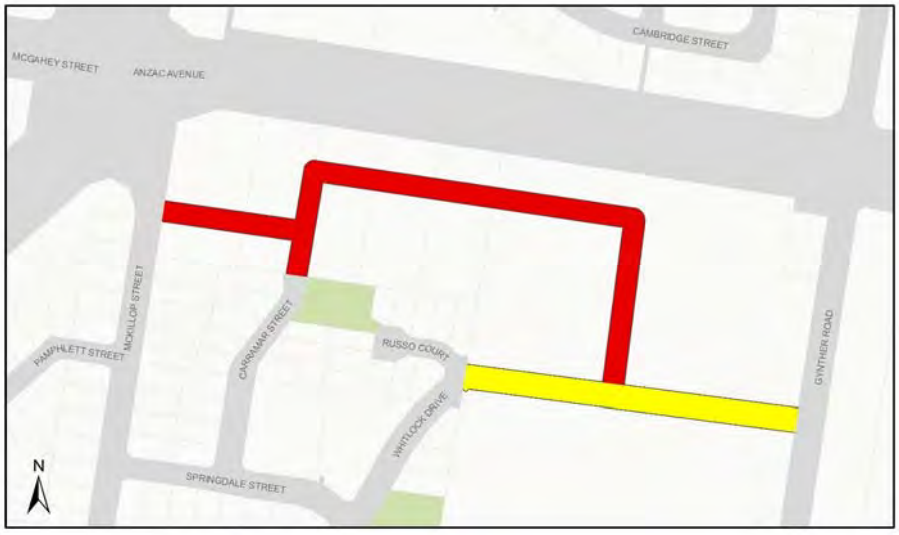
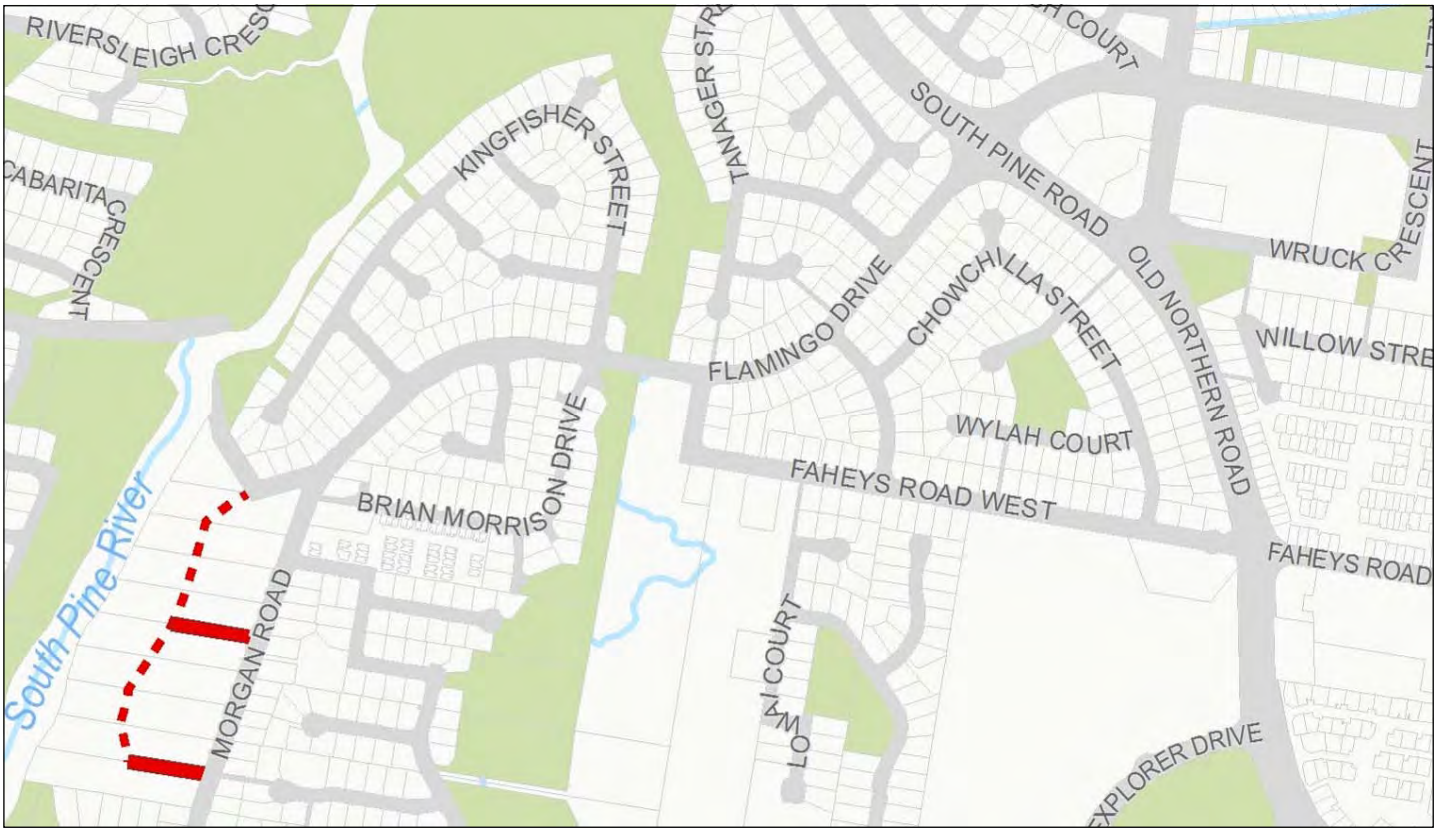


Figure A25 Albany Creek—Morgan Road



Planning Scheme Policy

How to prepare a structure plan

For State Approval - Major Amendment 1 - December 2017

Table of amendments

Date of adoption and effective date	Planning scheme policy version number	Amendment type	Summary of amendments

Contents

Planning Scheme Policy - How to prepare a structure plan

Adoption

Moreton Bay Regional Council adopted this planning scheme policy on …….. 2016.

Commencement

This planning scheme policy will take effect from …... Amendments to this planning scheme are included at **Table of Amendments** (inside front cover).

1. Introduction

This policy supports the Moreton Bay Regional Council Planning Scheme and has been made by Council in accordance with Chapter 3, Part 4, Division 2 and Part 5, Division 1 of the *Sustainable Planning Act 2009*.

1.1 Purpose

The purpose of this planning scheme policy is to:

a) Provide a framework for preparing a Structure plan required to support development within a Future Structure Plan Area as mapped on Overlay map - Structure plan areas.
b) Guide the planning process for development proposals within the Emerging community zone under the Moreton Bay Regional Council Planning Scheme (MBRC Planning Scheme) which commenced 1 February 2016.

1.2 Application

This planning scheme policy applies to development proposing to create serviced lots within the following zones, precincts or local plans:

a) Emerging community zone - Transition precinct;
b) Caboolture West local plan - All precincts.

1.3 Interpretation

Terms used in this planning scheme policy are defined in Schedule 1 – Definitions of the planning scheme. Where a term is not defined in Schedule 1, Section 1.3 Interpretation of the planning scheme applies.

2. The Strategic Framework

Through the MBRC Planning Scheme, Council has identified a number of potential future urban growth fronts. These include the following Emerging community areas and Local plan areas:

Emerging Community

- Burpengary East and Morayfield east of the Bruce Highway
- Morayfield south
- Narangba east
- Joyner
- Warner

Local Plan Areas

- Caboolture West

At the highest level, the MBRC Planning Scheme through the Strategic Framework recognises the vital role that Emerging community areas will play in accommodating the future population and delivering housing choice.

The key strength of the Emerging community areas lies in their locations proximate to the higher order centres and regional transport connections including the Bruce Highway and North Coast Rail Line. Council identified in the Strategic Framework that it will undertake further investigations in these areas to determine the potential to be redeveloped in part for future enterprise, employment, residential and other compatible and related purposes.

Despite this, the lack of urban infrastructure, presence of potentially significant environmental values and the dominant fragmented land pattern will constrain the ability to provide serviced urban land. Given these existing constraints and the number of development fronts in the Region, the MBRC Planning Scheme does not anticipate these areas to be required for urban development prior to 2031. The majority of these areas are likely to remain largely rural residential in nature until the area can be developed in a safe, effective, efficient and equitable manner.

3. The Emerging Community Zone

The Emerging community zone covers areas throughout the Moreton Bay Region that are not currently recognised or developed as urban environments, but may be suitable for future urban uses over the next 10 to 20 years. These areas require further detailed investigation to determine what future development options may exist, in what sequence and the infrastructure strategy that will support the preferred land use outcome.

The Emerging community areas are located outside of the Council's Priority Infrastructure Area (PIA) and Unitywater's Connection and Future Connection Areas and as such limited trunk infrastructure planning has been prepared for these areas and no trunk infrastructure has been identified within the infrastructure schedules of the Council's Priority Infrastructure Plan (PIP) or Unitywater's Netserve Plan to support development of these areas.

For each Emerging community area, whole of catchment infrastructure solutions are required for the five networks (Water, Sewerage, Transport, Stormwater and Community Infrastructure). This detailed network planning requires the partnering of Council and Unitywater. In this regard, a Structure planning process is required for each of these areas to provide Council and Unitywater with the required planning work to enable development proposals to be appropriately considered. To support any proposed development within these areas the Council together with Unitywater is proposing the introduction of a Coordinating Infrastructure Agreement.

4. Preparing a Structure Plan

Each of the Emerging community areas has varying degrees of land use and infrastructure planning. In order to appropriately plan for the necessary infrastructure, a detailed Structure plan will need to be prepared and endorsed by Council.

The following steps outline the process required to prepare a Structure plan and the component outcomes of each stage. The outcomes of each stage of the process will be subject to review and endorsement by Council and where applicable, Unitywater and relevant State agencies.

Refer to the following planning scheme policies for further detail:

a) Neighbourhood Design;
b) Integrated Design (and its associated appendices); and
c) Integrated Transport Assessment.

The roles and responsibilities across the Structure planning process will be further defined through a detailed planning brief as part of the Structure plan development process.

STEP	TASKS	OUTCOMES
Step 1: Structure Plan Area scope	Establish the area that will be subject to the preparation of the Structure plan (Structure Plan Area).	**1. Structure Plan extent -** Confirmation of the area that the Structure plan process will be applying to.
Step 2: Site context - opportunities and constraints identification	Establish the site context, major site features (e.g. land form, views, utility corridors, existing roads) and environmental constraints and opportunities (e.g. green network corridors, steep slopes, flood hazard, bushfire hazard, heritage and environmental values).	**2. Site context plan** - *Establishing the urban and non-urban areas for the Structure Plan area.*
Step 3: External influences	Identify significant external connections to and from the Structure Plan Area and specific Site, such as existing roads, waterways, environmental corridors, view scapes and water catchments.	**3. High level Structure Plan -** Identifying the main external influences and relationships with the Structure plan area that need to be factored into the Structure plan.
	Identify external drainage and open space networks, existing and proposed facilities and services (e.g. schools and community facilities, services and centres) and employment opportunities and their relationship to the site.	
	Water and Sewerage Services: a. Identify areas that cannot be served with reticulated water due to topography constraints; b. Identify any constraint on the capacity of sewage treatment and/or disposal of treated effluent which effects the scale or timing of development.	
	Identify elements of the Moreton Bay Region Total Water Cycle Management Plan which must be incorporated into the development proposal.	
Step 4: Movement and service connections.	Identify the movement and service corridor policies and principles to be addressed in the Structure plan process.	**4. Movement and service connection strategy** and **Draft Plans** - Including: **Road network plan** *(Functional Road Hierarchy classifications); and* **Active transport plan** *(Pedestrian & Cyclist movement)*
	Establish major local movement systems into and out of the Structure plan area (including any impacts on State controlled roads).	
	Identify opportunities for bicycle and pedestrian movements through and beyond Structure plan area.	
	Establish street connections to facilitate local and external movement and identify options for service connections.	
	Establish the basic movement network, linking existing streets where necessary and ensuring good local connectivity, permeability and legibility.	
Step 5: Integrated and coordinated urban design processes and techniques.	Use urban design workshop/urban design processes to bring together the outcomes of steps 1 to 4 to develop/refine land use strategies for the neighbourhood (Refer to Section 6 - Refining the Layout for further information).	**5. Detailed Structure Plan;** and **6. Supporting Structure Plan area report.**
	Produce land use options at scales between 1:5,000 and 1:1,000 as required to map out in detail the Structure plan.	
	Refine the design outcomes to a level that enables the Structure plan to be used as an “acceptable outcome”.	
	Convert movement networks to a street and path layout, considering issues such as safety, legibility, environmental capacity, allotment layout and	

	orientation, water supply network water quality and climatic factors.	
	Convert precincts, sub-precincts and movement networks into detailed land use, and block layouts and land requirements for non-residential activities and facilities.	
	Determine benchmark development densities, broad distribution of lot sizes, housing types and intended built form outcomes.	
Step 6: Infrastructure *Network Planning.*	Prepare planning assumptions for the Emerging community area (determine the type, scale, location and timing of development).	**7. Infrastructure Strategy** and **Draft Infrastructure Plans -** for each of the five networks; and
	Estimate the demand for infrastructure for all 5 networks (water, sewerage, transport, Stormwater and Community Infrastructure) that will be generated and identify the most appropriate means for provision applying the Principles for Infrastructure listed in Section 5 of this document and the Standards of Service identified in the Priority Infrastructure Plan (PIP) and Unitywater's Netserv Plan.	
	For each network, provide detailed preliminary network design, timing of asset delivery and cost estimates for servicing the whole of the Emerging community area (this should be based on a least cost lifecycle approach).	
	Produce a staging plan, including mechanisms for utilising and allocating interim or residual network capacity.	

5. Principles for Infrastructure

The following principles apply for the development of a trunk infrastructure solution for the Emerging community areas:

a) Whole of catchment infrastructure solutions are required for each of the five networks (water, sewerage, transport, stormwater and community infrastructure). The catchments will include the Structure plan area and any additional area of influence for a specific network.

b) All landowners in the Structure plan area will contribute to the ultimate infrastructure solution.

c) The infrastructure expenditure and cost recovery mechanism (e.g. a developer contributions scheme or cost benefit area scheme including provisions for any infrastructure credits and/or offsets) will be documented in a Coordinating Infrastructure Agreement (CIR) outlined in section 7 of this document.

d) Any available capacity in the existing networks, where available, will be accessible to all landowners equitably but only once the whole of catchment solution is resolved. The identification, apportionment and duration of the available capacity shall be considered and documented in a CIA.

6. Staged Review and Prelodgement

Prior to the Structure planning process and at each stage during the process, the proponent will be required to meet with Council to initially establish a project team, including Senior Officers from Council, Unitywater and relevant State agencies, schedules, obtain detailed planning briefs, and then to review and endorse the outcomes from each stage of the Structure planning process as specified above. Other key stakeholders may be identified for each Emerging community area in consultation with the proponent/s. The proponent is expected to fully commit to the process and provide appropriate team members to support the required outcomes.

7. Coordinating Infrastructure Agreement

The purpose of a Coordinating Infrastructure Agreement (CIA) is to set out development responsibilities for an area of land, generally identified as a Structure plan area. A CIA is used to enable new urban areas to be serviced and brought to market sooner than anticipated by service providers.

It is important to note that necessary infrastructure for the development of these areas is not always contained within the area itself. Development of these areas may have implications for infrastructure (e.g. intersections and roads) external to the Structure plan area.

The CIA sets out:

a) What infrastructure is needed (within and external to the area);
b) The sequence the infrastructure should be provided in;
c) The location of infrastructure;
d) The cost of providing the infrastructure;
e) A financial contribution from landowners and development proponents, per land use, to recover the cost of infrastructure provision;
f) The portion payable for each network;
g) Who is responsible for providing the infrastructure;
h) The offset, refund and credit framework; and
i) Other matters such as determining bring forward cost.

Unitywater and possibly the State government, to identify the infrastructure necessary to service a Structure plan area in the future. These infrastructure authorities are to be parties to the CIA.

Once a CIA is in place and the area is identified as a 'Structure planned area' in the Council's Planning Scheme, a landowner may apply to the infrastructure authorities for their land to be subject to the CIA. The process of identifying a 'Structure planned area' in the planning scheme through the major amendment process will provide an opportunity for the community and stakeholders to have a say about the proposed changes as a major amendment to a planning scheme is required to undergo a public consultation phase. This would be done by way of a 'Service area extension request' notice under the CIA. The CIA would provide for the identification of the responsibilities on each of the infrastructure authorities and any party that has successfully applied to have their land subject to the CIA. The responsibilities agreed too would then attach to the premises and bind the owner of the premises and the owner's successors in title.

Once the structure planning is finalised the relevant infrastructure service providers negotiate the terms of the CIA, being:

a) What infrastructure is needed (within and external to the area);
b) The sequence the infrastructure should be provided in;
c) The location of infrastructure;
d) The cost of providing the infrastructure;
e) A financial contribution from land owners and development proponents, per land use, to recover the cost of infrastructure provision;
f) The portion payable for each network;
g) Who is responsible for providing the infrastructure;
h) The offset, refund and credit framework; and
i) Other matters such as determining bring forward cost.

8. Subsequent Development Application

Once land is identified as a 'Structure planned area' and a 'Service area', the proponent can then move onto detailed design and pre-lodgements to support the submission of a development application for 'Serviced lots' in accordance with the applicable triggers and codes for the Emerging community zone in the MBRC Planning Scheme.

Refer to the following planning scheme policies for further information and guidance on the desired standards for infrastructure, policy outcomes, principles for neighbourhood design, transport networks and detailed design outcomes to be achieved as part of a Structure plan and subsequent development application:

- Neighbourhood Design;
- Integrated Design;
- Integrated Transport Assessment.

Planning Scheme Policy

Structure plan - Caboolture West - Area 1

For State Approval - Major Amendment 1 - December 2017

Table of amendments

Date of adoption and effective date	Planning scheme policy version number	Amendment type	Summary of amendments

Table of Contents

Planning scheme policy – Structure Plan - Caboolture West - Area 1

Adoption

Moreton Bay Regional Council adopted this planning scheme policy on <xxxx>.

Commencement

This planning scheme policy will take effect from <insert date>. Amendments to this planning scheme are included at **Table of Amendments** (inside front cover).

1. Introduction

This policy supports the Moreton Bay Regional Council Planning Scheme and has been made by Council in accordance with Chapter 3, Part 4, Division 2 and Part 5, Division 1 of the *Sustainable Planning Act 2009*.

1.1 Purpose

The propose of this policy is to contain the relevant information resulting from structure planning work undertaken in accordance with Planning Scheme Policy - Preparing a structure plan for Caboolture west - Area 1 as identified on Overlay map - Structure plan areas.

This policy is the Structure plan (as defined in the MBRC Planning Scheme) for this Structure planned area.

At the time of drafting the definition of Structure plan reads as follows:

Structure plan *- A document prepared in accordance with Planning scheme policy - Preparing a Structure Plan. Structure plans include relevant background information in relation to:*

a) The location and quantity of land uses, in the form of assumptions, that are based on and consistent with the outcomes in the Planning scheme used to inform b. below;

b) The type and location of necessary infrastructure and accompanying background information for each of the following networks:

- *Roads;*
- *Active transport;*
- *Open space and community facilities;*
- *Stormwater - Quality and quantity;*
- *Water;*
- *Sewerage.*

Note - Structure plans will take the form of a Planning Scheme Policy contained within Schedule 6 of the planning scheme

While technical reports and detailed information are required to inform the development of a Structure plan for an area in accordance with Planning scheme policy - Preparing a structure plan, reproducing these is not the purpose of this Planning Scheme policy. This Policy represents a holistic approach to the future planned development for the area, having considered all relevant background and supporting information and options analysis in its development. This Planning scheme policy represents the end product of this work.

1.2 Application

This policy relates to development requiring assessment which is undertaken within Area 1 of the Caboolture West Local Plan and is to be read in conjunction with the Caboolture West Local Plan Code.

1.3 Interpretation

Some terms used in this planning scheme policy are defined in Schedule 1 – Definitions of the planning scheme. Where a term is not defined in Schedule 1, section 1.3 Interpretation of the planning scheme applies.

2. Caboolture West Local Plan Context

The Caboolture West Local Plan was prepared by Moreton Bay Regional Council in consultation with State Agencies following the Ministerial Declaration of the Caboolture West Master Planned Area in February 2012. The planning process to prepare the Local Plan has been intensive and comprehensive, encompassing a wide range of issues and considerations including the following:

a) Environmental and ecological values;
b) Agriculture and strategic cropping(19) land;
c) Housing needs;
d) Future employment and business needs;
e) Infrastructure requirements (public transport, roads, water, sewerage and stormwater);
f) Parks, open space and community uses(17);
g) Economic and financial impacts.

Urban design has been an integral part of the planning process from initial scenario development through to detailed master planning. Council's urban design goal has been to design places that work best for people, from the region as a whole to neighbourhoods and precincts and to individual public spaces, streets and buildings. The urban design of Caboolture West will affect its economic vitality, community well-being and environmental sustainability. It will influence how well its community will be able to respond positively to things such as climate change, changing lifestyles, innovative communications technology and an ageing community.

3. Structure Plan Area 1

3.1 Background

The structure plan is the level of planning between the Caboolture West Local Plan and a development application. The structure plan primarily identifies the provision of the infrastructure networks for roads, active transport, open space and community facilities, stormwater (quantity and quality), water and sewerage. A structure plan also identifies other elements such as key land uses and the green network in order to provide a context and planning assumptions for the infrastructure network requirements which have been identified. The preparation of the structure plan further informs the provisions of the planning scheme relating to the location of precincts and sub-precincts for an area.

The information contained within the maps of this policy provides background information supporting the structure plan maps and addresses and rationalises important contextual issues, the master planning and urban design process undertaken, and planning for the infrastructure networks. The following section summarises the land use and infrastructure network planning components of the structure plan.

3.2 Land Uses and Infrastructure Networks

Overlay Map - Caboolture West Area 1 Structure Plan identifies the extent of the area to be the subject of detailed land use and infrastructure network planning. The overlay map identifies the location and sequence in which future structure plans will be prepared.

Area 1 is located at the south-east corner of the Caboolture West Local Plan Area. The area is predominantly cleared and apart from several existing waterways, the land is relatively easy to develop with high landscape character along the Caboolture River. Figures 7.2.3.1 to 7.2.3.8 contained in the Caboolture West Local Plan Code form the basis of the land use and infrastructure network planning for Area 1. The structure plan has been prepared in accordance with the Planning Scheme Policies for

Neighbourhood Design and *Preparing a Structure Plan*. The preparation of the structure plan is also informed by considering, in further detail, the issues relating to the following:

3.2.1 Landscape character

Detailed investigations were undertaken to determine Glass House Mountains viewing opportunities and the related integration of the green network into the centre of Area 1, which will provide the most significant contribution to the landscape character. This landscape character will be defined by protected views to the distant mountains at key locations from within Area 1. Local parks are to be provided at these key locations, at major access points to the green network, and centrally within each of the neighbourhoods.

There are five strategically located viewpoints within Area 1 which should gain views to up to seven of the Glass House Mountains. All of these primary viewpoints are located in proximity to open space or local recreation parks and are anchors to existing and future trunk road reserves. This is to minimise the impact of buildings and other structures so they will not detrimentally impact on the view. Where sufficient open space is not available to ensure the view is not impacted, then the height of development, including buildings, park and street tree planting is limited within defined view-sheds to ensure the mountain views are preserved. The Overlay - Building heights found in the planning scheme sets outs the height limits in selected areas which supports this outcome.

The other key component to linking the neighbourhood with the Glass House Mountains, open space network, and the Caboolture River are the landscape character streets. These streets, which are located along Craig Road and a new street approximately half way between Craig Road and Hausmann Lane, align with the Glass House Mountain view-sheds and link the Local Centre sub-precinct and indicative future neighbourhood hubs with the open space network. The landscape character streets have a wide verge which is offset to one side, allowing for a greater diversity of landscaping, tree planting, and pedestrian use that has the effect of converting the street into a linear park.

3.2.2 Co-location of district sports park, local centre, schools and community centre

Figure 7.2.3.1 - Caboolture West Structure Plan of the Local Plan Code required a district sports park to be located in the north-west section of Area 1 and also identifies the need, though it does not provide a specific location, for provision of a state primary school. The location of a school in proximity to the district sports park was initially considered desirable as it would provide an opportunity for a school to share use of the sports facilities. However the strategic traffic modelling showed that the district sports park and school in this scenario would be ultimately separated by a sub-arterial road, an undesirable relationship which warranted reconsideration of the school's location. Furthermore, Council's *Interim Sports Facilities Plan 2012-2031* identifies locational criteria for the provision of a district sports park which are:

a) Buildings are to be above the 1% AEP;
b) Formal recreation areas, internal roads, hard courts and vehicle parking are to be above the 2% AEP; and
c) Playing fields are to be above the 5% AEP.

It has resulted in the initial concepts relating to the provision of a school and the district sports park in Area 1 of Caboolture West needing to be reconsidered. The process set out within the *Neighbourhood Design* and *Preparing a Structure Plan* Planning Scheme Policies provides details for how the land use and infrastructure network planning is to be integrated and undertaken.

Discussions held with private school providers during the early stage of the structure planning process identified the possibility of also locating a private primary school within Area 1. The concept of establishing a local knowledge centre was then further explored at this point in time and informed the basis of the site planning and relational requirements in co-locating a district sports park, primary schools (state and/or private), a community centre and the Local centre.

Locating the schools close to the Local Centre would provide the opportunity for them to begin operating within the first 3-5 years of development commencing. This would be at an easterly location close to the existing sewerage network in Dobson Lane with vehicular access off the existing Craig Road

reserve, rather than at the north-west location previously identified. This alternative location would also ensure there was sufficient separation from the school at Bellmere Road to the north east of Area 1.

There are advantages in co-locating the district sports park in association with the primary schools and community centre while there are also community benefits in bringing forward the purchase and development of the district sports park to service a growing community in association with the schools. The benefits include efficiencies in delivery and sharing of facilities such as a school/community library, car parking, and community hall.

Co-locating the sports fields with the school and community centre results in the Local Centre being located on the western side of Craig Road at the Caboolture River Road intersection. The Local Centre will have exposure to a road with high traffic volumes but is able to ensure that a 'main street' design and function is provided for this community along the Craig Road frontage.

The land areas provided for the district sports park, schools, community centre and Local Centre within the land use and infrastructure network figures of this policy are based on the standards of service and minimum requirements for each provider of these components.

3.2.3 Green network

The location of the Green Network is based on the areas identified in Figures 7.2.3.1 and 7.2.3.4 of the Caboolture West Local Plan Code. The extent of the area identified has been refined following the detailed assessment of further information especially relating to the location of flooding, slopes and the location of significant vegetation. The four criteria which determine the extent and location of land within the Green Network in Area 1 are:

a) Environmental buffer - land within 100m to Caboolture River measured from the top of bank;
b) Riparian and waterways setback - land within 30m from top of bank for W2 class waterways, 20m for W3 waterways;
c) Flooding - land below 1% DFE;
d) Slopes - land greater 15% where adjacent to or in association with the above criteria.

3.2.4 Transport

The road infrastructure network is seeking to ensure the area is developed with a highly connected and permeable road network that supports high levels of bicycle and pedestrian use. Prioritisation of these modes also supports high levels of access to public transport which will service the area. The network is a key structural element that provides a framework for:

a) the pattern of land use;
b) the arrangement of neighbourhoods;
c) the configuration and alignment of local streets and other infrastructure networks.

Two options for the overall structure of the transport network throughout Area 1 were modelled, being:

a) a direct through-route from the intersection of Caboolture River Road and Tinney Road to the future Caboolture West Town Centre plus associated roads designed to distribute traffic throughout Area 1; and
b) a distributed grid option, intended to provide a greater choice in moving throughout Area 1.

The latter option was chosen as it distributes lower volumes around and throughout the neighbourhood. The outcomes of the strategic traffic modelling provided the basis for the overall road and street network. At a broad level, the following roads are required to be identified:

a) arterial
b) sub-arterial
c) district collector
d) local collector

The preferred location of the road network was determined according to the following criteria:

a) connection with planned major routes to other parts of Caboolture West, including the future town centre to the north and local centre to the west of Area 1;

b) straddle property boundaries to provide for equity in delivery while not compromising ability to develop;
c) if appropriate, follow existing road reserves;
d) provide for safe and efficient access to key sites including the district sports park and primary school;
e) enable staged delivery of the network e.g. conversion of a local collector to a main street when alternative access is required via high order streets;
f) provide for view-lines to as many Glass House Mountains as possible;
g) provide for direct and where possible uninterrupted pedestrian and cycle access from within the developed areas to destinations including the Green Network precinct, Local Centre and neighbourhood hubs;
h) balancing all of the above and allowing for as much riverside development area as possible.

3.2.5 Open Space and Community Facilities

Figures 7.2.3.1 and 7.2.3.4 of the Caboolture West Local Plan Code show two district sports parks being located in the north-west of Area 1 and on the northern side of Caboolture River within a future structure plan area. Further analysis of the desired level of service for district sports parks into their possible co-location with the primary school/s and other community facilities has revealed the need for only one pair of multi-purpose sports fields within Area 1.

Council's *Interim Community Facilities Plan 2012-2031* identifies the rate of provision for local community centres at one per 10,000 people. With the shift away from building stand-alone facilities in residential areas which are often poorly-utilised, well used community facilities tend to be located in places that are readily accessible by public transport, pedestrian and cycle pathways, and where people already congregate such as shopping centres and schools. This allows people to combine trips to the facility with other activities. The location of the community facility close to the local centre and other uses such as schools in Area 1 satisfies this desired outcome. The minimum requirements for the provision of a facility are 5 000 square metres for the land component, all of which is to be above the 1% AEP, and provision of a building with a gross floor area of 800 square metres.

Building upon the framework to maintain and enhance views to the Glass House Mountains, local recreation parks are to be provided at the locations identified in the infrastructure network maps as well as at major access points to the green network and centrally within each of the neighbourhoods.

3.2.6 Stormwater

The stormwater network figure in the Policy identifies the individual catchments for Area 1 and the indicative flow paths. For stormwater quantity, the overall solution has been based on the establishment of fully developed catchment models for the 5%, 1% and 0.1% AEP which demonstrate there is no downstream increase in risk levels. The stormwater quality analysis has updated previous source catchments and music modelling with improved inputs to identify the infrastructure solutions.

Analyses for both parts of stormwater identify the outcomes as being a combination of engineered solutions in conjunction with targeted revegetation.

3.2.7 Water and Sewer

Unitywater are identifying a "whole of Caboolture West" solution for the water and sewer networks. Interim solutions have been identified to service Area 1 which ensures there is capacity and infrastructure in place. The initial extent and location of the networks are identified on the Major Infrastructure - Water and Sewer figure in this policy.

3.2.8 Structure Plan Summary

The urban structure and land use pattern of Area 1 envisages an integrated next generation community laid out in walkable neighbourhoods. The structure plan is based on a neighbourhood model including the application of current industry-based best practice in terms of block, street and local recreational park design. Central to the design outcome envisaged for Area 1 is the provision of a main street, with high landscape character, utilising the existing Craig Road reserve. This area contains the local knowledge centre comprising the Local Centre, primary schools, district sports park and community

facility. Having these uses provided in the early stages of the development of Area 1 is a key outcome which will set the standard for the successful establishment of other future communities in Caboolture West.

A major component of the landscape character for Area 1 is defined by protected views to the Glass House Mountains. For this, the road and open space network play a significant role in ensuring this outcome is achieved. Local parks are provided at key locations to enhance the viewing opportunities while roads, including the main street of the local centre, are all aligned to maximise glimpses and views to the Mountains. The Overlay - Building height is to be read in conjunction with this policy as it sets out height limits in selected locations of Area 1 which support the achievement of the desired landscape character. Other parks and open space throughout Area 1 will include active transport links and linear corridors with local recreational park areas and areas dedicated to stormwater management.

4. Maps - Land Uses and Infrastructure Networks

The following maps set out the location of selected land uses and major infrastructure networks.

Figure 1 - Land Uses

This plan illustrates the land use planning assumptions used to determine the extent and location of major infrastructure identified in this PSP.

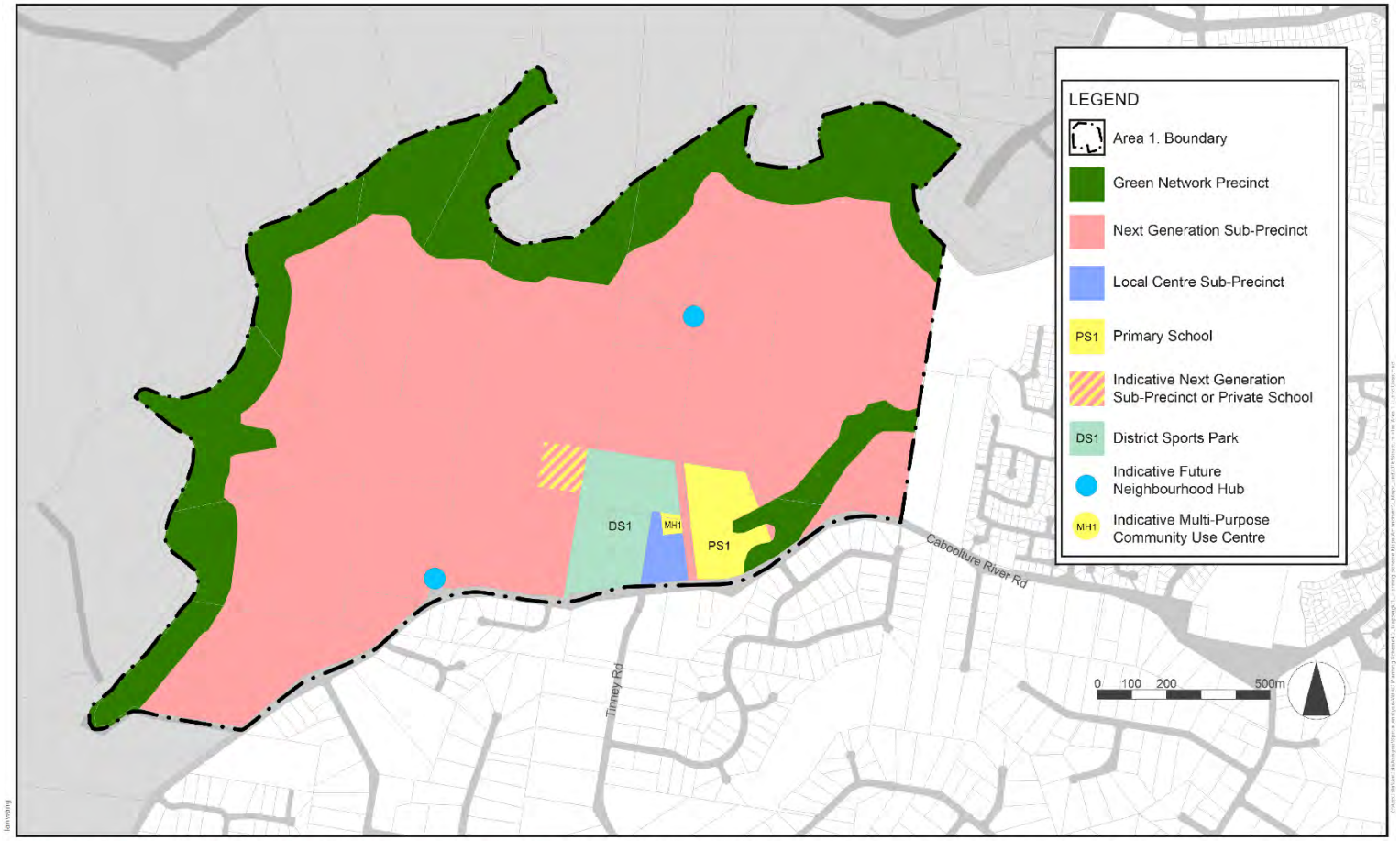


Figure 2 - Major Infrastructure - Road Network

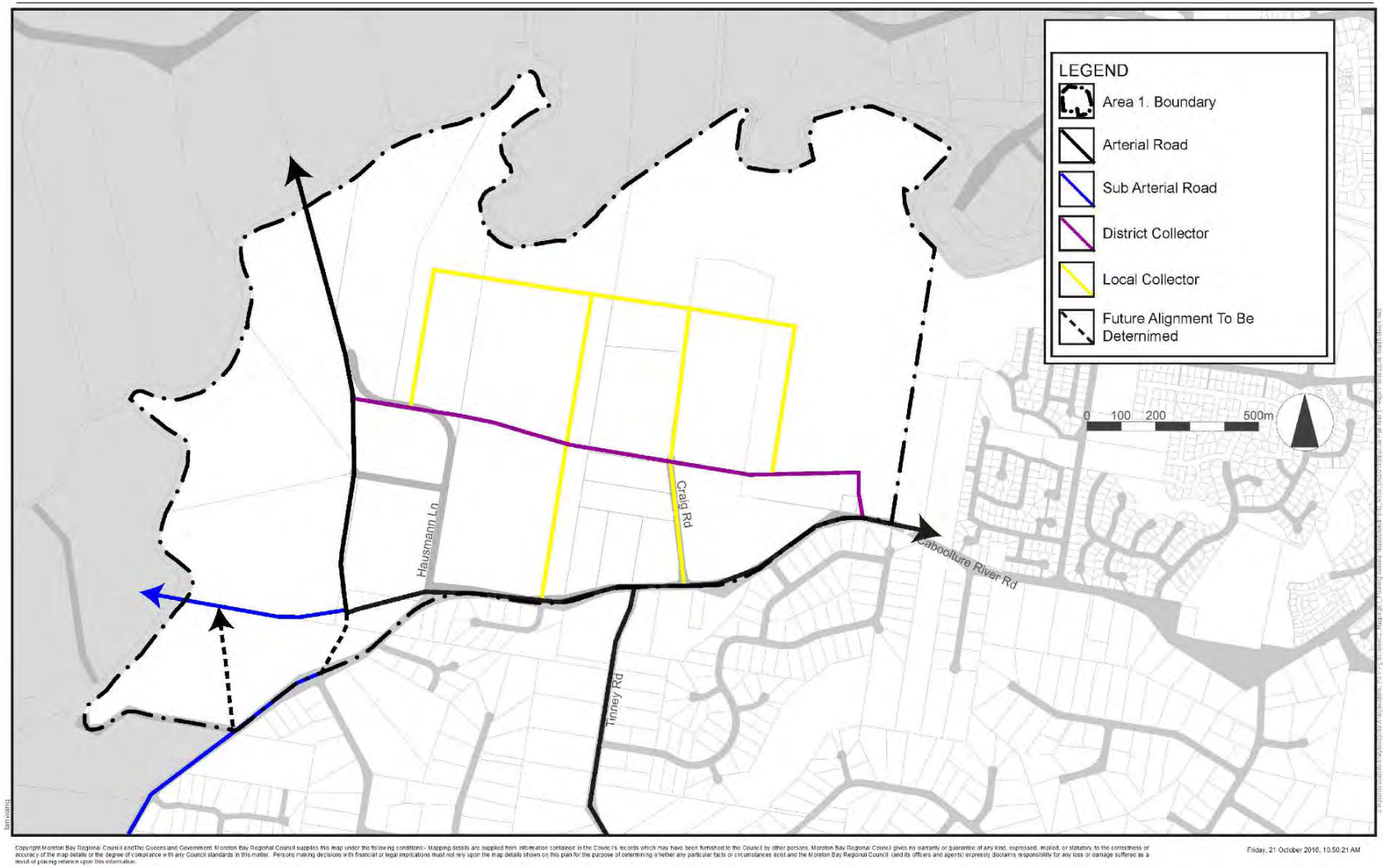


Figure 3 - Major Infrastructure - Road Types

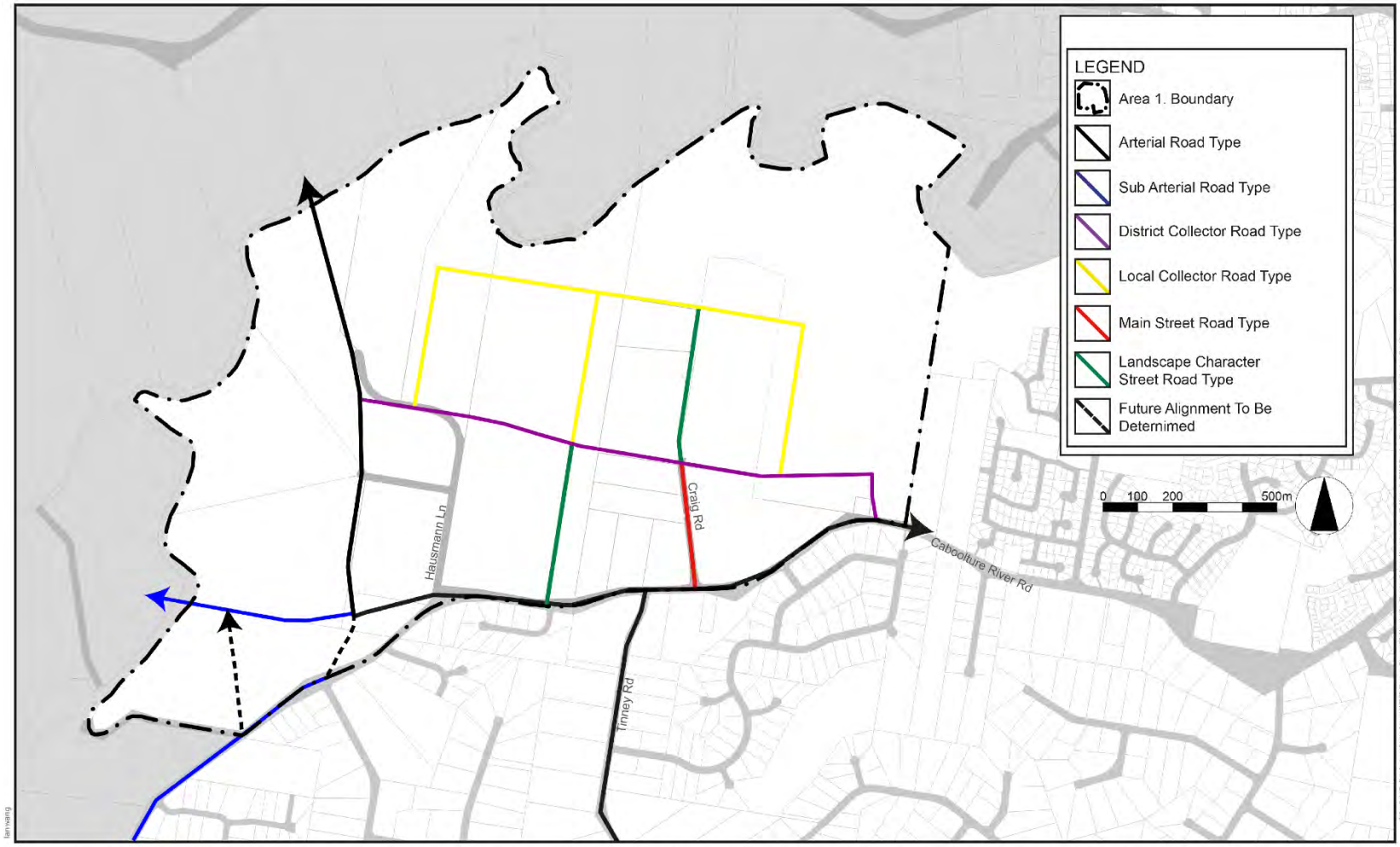


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Figure 4 - Major Infrastructure - Active Transport

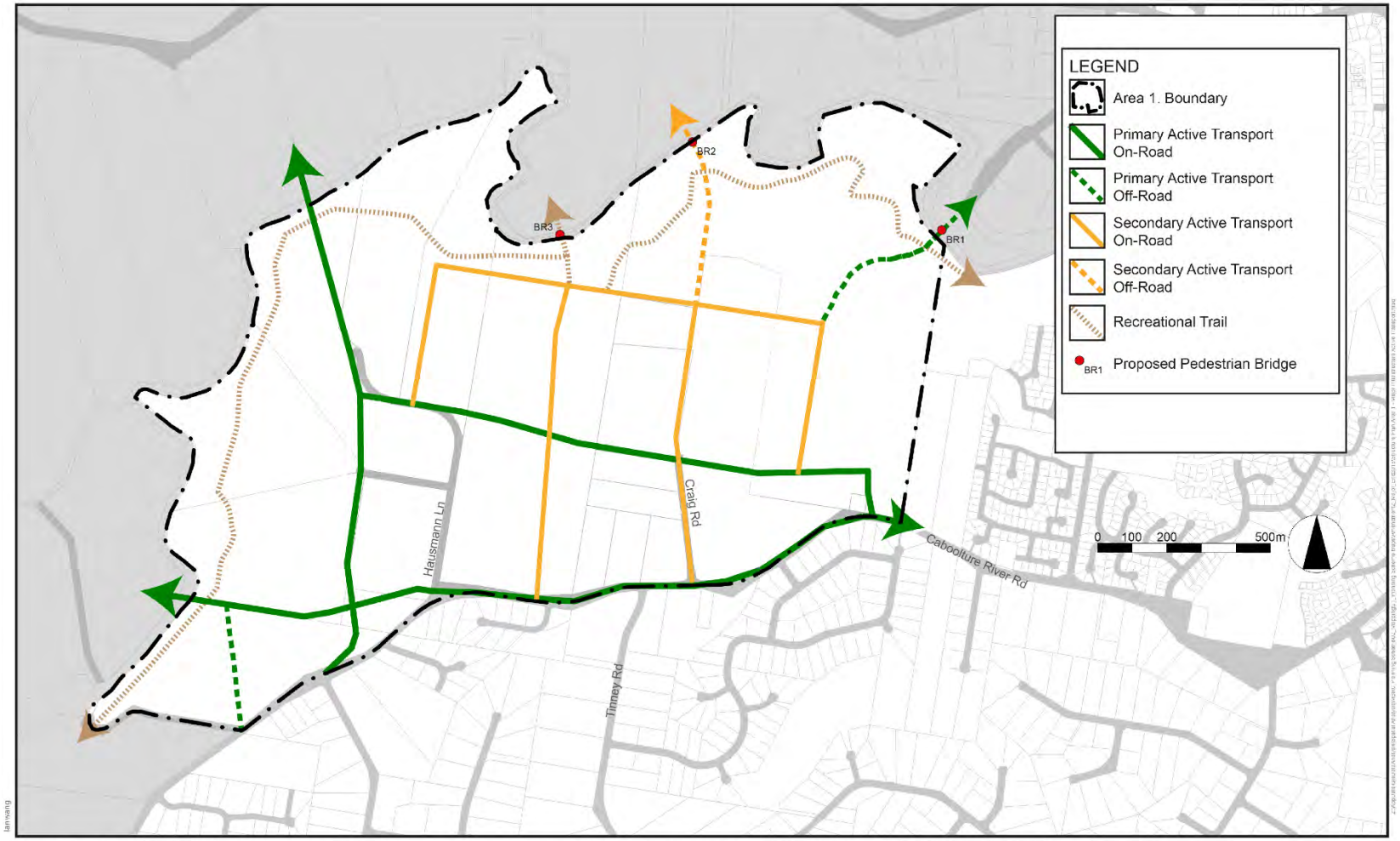

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Figure 5 - Major Infrastructure - Open Space and Community Facilities

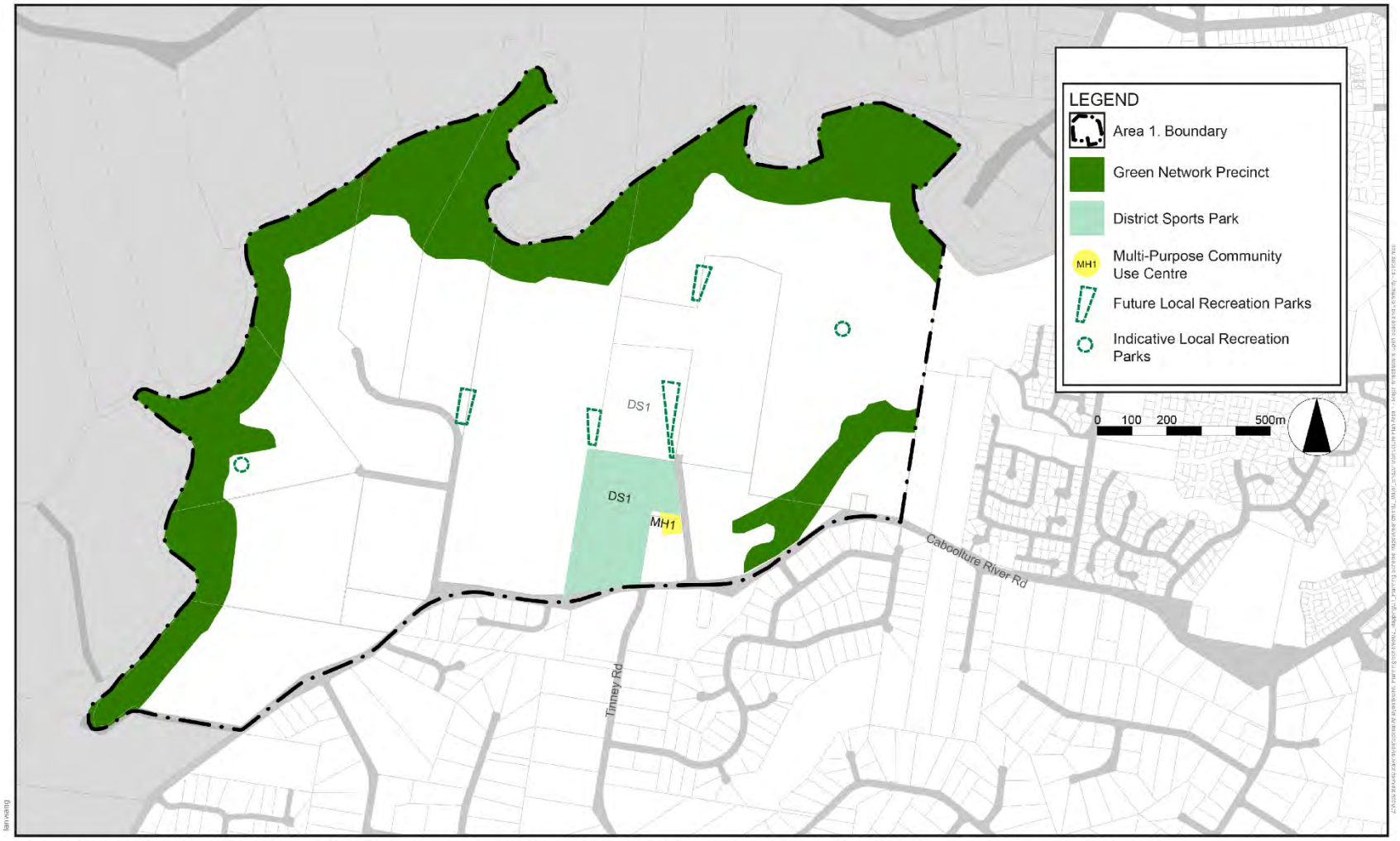

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Figure 6 - Major Infrastructure - Stormwater

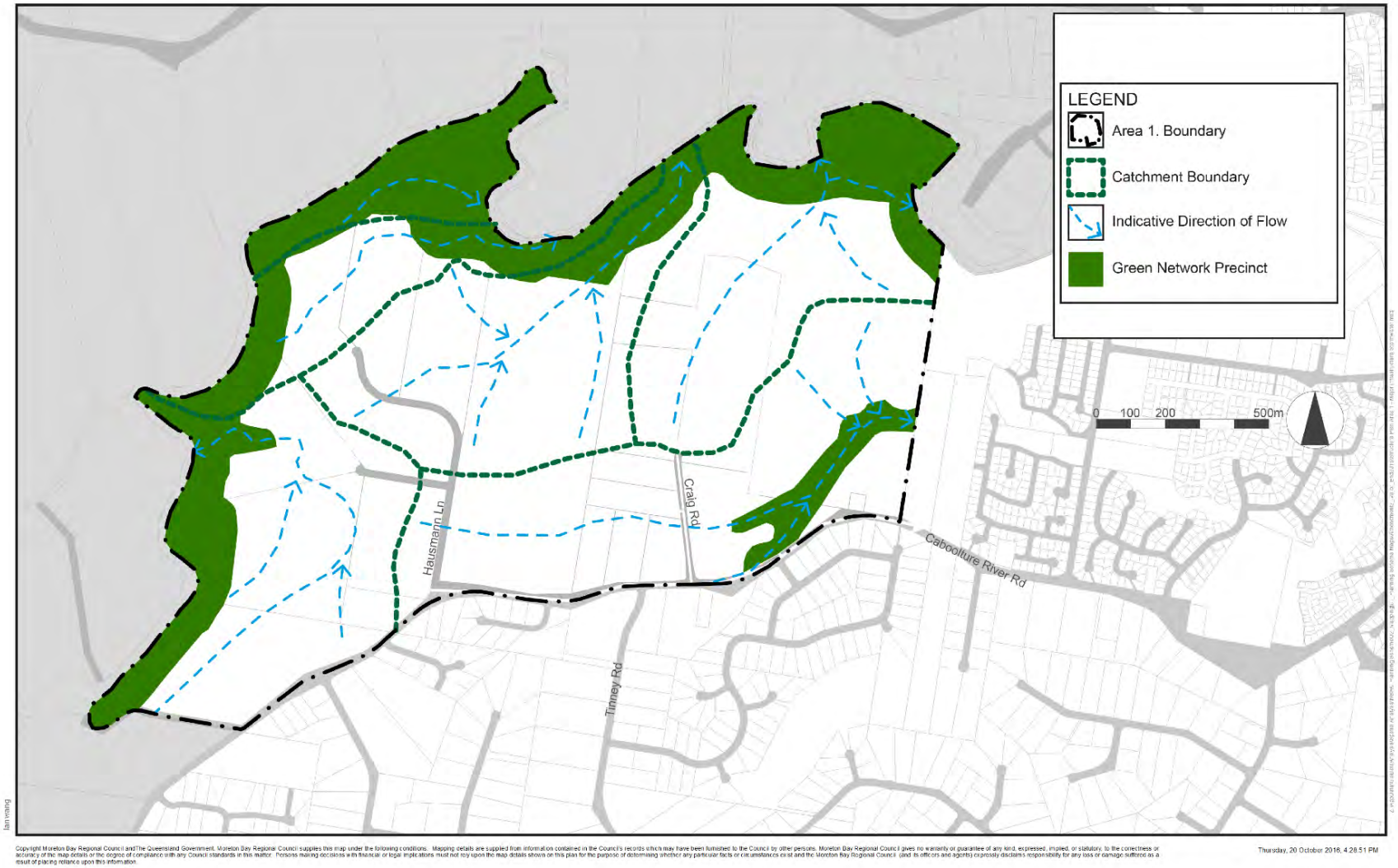

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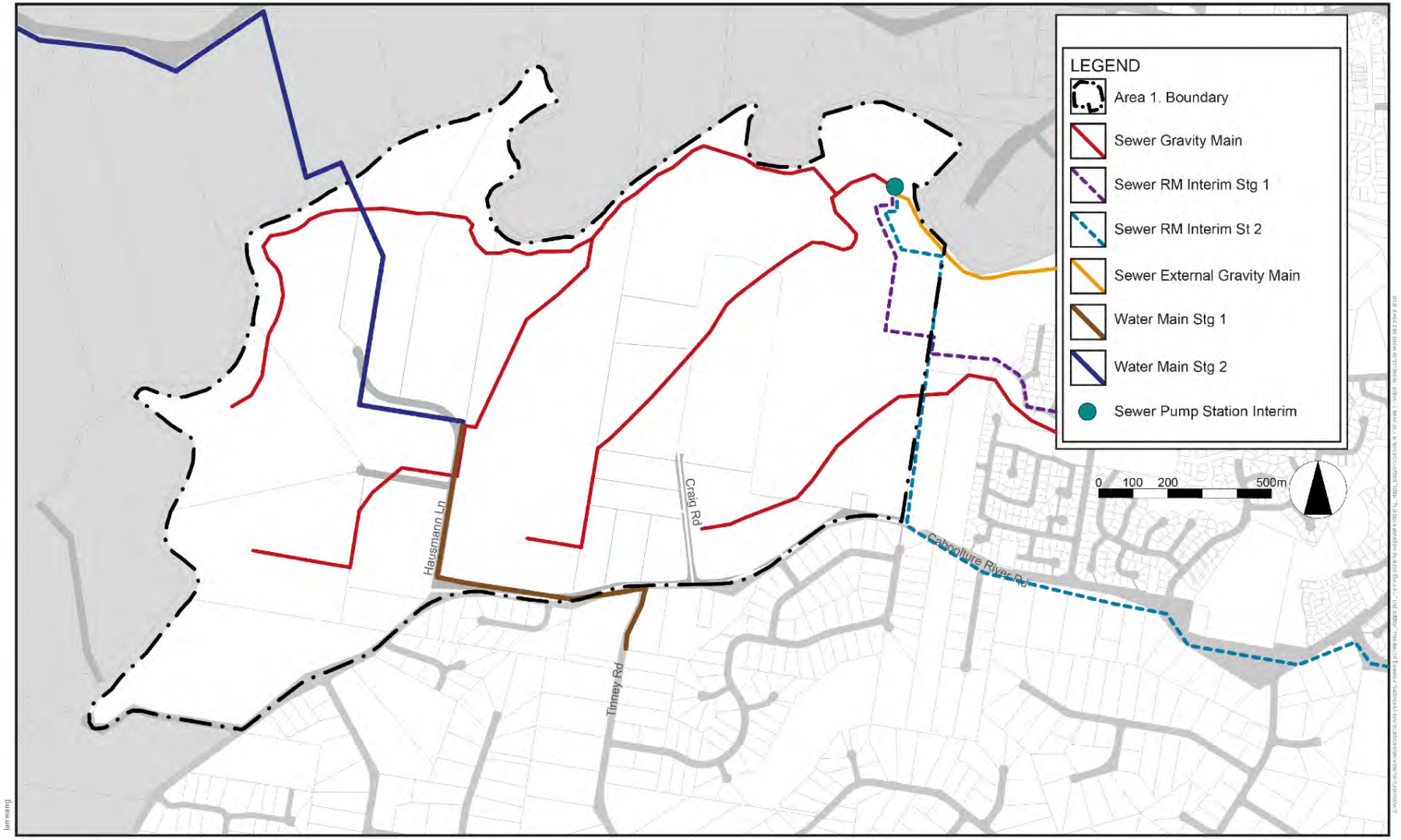
Figure 7 - Major Infrastructure - Water and Sewer



Planning Scheme Policy
Township character

For State Approval - Major Amendment 1 - December 2017

Table of amendments

Date of adoption and effective date	Planning scheme policy version number	Amendment type	Summary of amendments

Planning Scheme Policy - Township character

Adoption
Moreton Bay Regional Council adopted this planning scheme policy on xxx.

Commencement
This planning scheme policy will take effect from xxx.

1. Introduction
This policy supports the Moreton Bay Regional Council Planning Scheme and has been made by Council in accordance with Chapter 3, Part 4, Division 2 and Part 5, Division 1 of the *Sustainable Planning Act 2009*.

1.1. Purpose
The purpose of this planning scheme policy is to:

a) provide additional information in the form of images and explanatory text to provide design guidance about satisfying assessment criteria identified in the planning scheme;
b) accommodate urban growth sympathetic to rural lifestyle;
c) encouraging design solutions to reinforce a strong sense of rural identity and community;
d) increase stakeholder understanding of the range of alternatives and traditional architectural style elements to reinforce the historic Australian country town character of the zone which will create recognisable images, economic prosperity and community pride in the rural towns and villages of Dayboro, Samford Village, Woodford, Wamuran and D'Aguilar.

1.2. Application
This planning scheme policy may be applied to development in all precincts of the Township zone.

1.3. Interpretation
Terms used in this planning scheme policy are defined in Schedule 1 – Definitions of the planning scheme. Where a term is not defined in Schedule 1, section 1.3 Interpretation of the planning scheme applies.

1.4. Who should use the Township character planning scheme policy
This planning scheme policy is intended to be used by developers and designers, development assessment planners and building professionals. This document may be referred to in information requests.

1.5. How to read the Township character planning scheme policy
This planning scheme policy is not a prescriptive tool, it is intended to raise general awareness about design ideas and innovative solutions for development in the Township zone.

1.6. Disclaimer
Diagrams and photos used in the planning scheme policy may not comply with all assessment criteria in the planning scheme. Some diagrams and photos have been used to illustrate a particular element and should be used as such.

Where conflict occurs between the planning scheme and the content, diagrams or images in this policy, the planning scheme prevails.

2. Rural Township places

The Moreton Bay Regional Council Place model has been used in the Strategic framework to identify and describe a series of broad scale place types, each with a distinguishing mix and intensity of uses, development forms, character, function and special qualities to guide the planning and development of the diversity of places across the region. This approach is intended to integrate issues of sustainability and resilience with better designed and planned places with an appropriate mix and scale of activities.

Rural Townships have a long history and established individual character and identity which has evolved over time. This character provides an identity, conveys a particular image and produces an impact, particularly to visitors. Rural townships play an important social and economic role in the Moreton Bay Region providing a popular tourist destination for both residents and visitors.

The Township zone code and associated precincts seek to reinforce the rural community and country town character in relation to both the natural and man-made streetscapes and landscapes. They seek to prevent the intrusion of incompatible development to ensure the unique character of the rural towns and villages of Dayboro, Samford Village and Woodford is protected to reflect the strategic outcomes set out in the Strategic framework.

These communities enjoy a quiet, relaxed lifestyle where the surrounding rural and natural landscape, vistas and privacy are key features. Community activities within the townships and their rural heritage are also important elements to be protected. Rural townships are more than just retail centres, but also a cultural and community heart, a meeting place. As such the Township Code aims to protect and enhance the landscape, scenic and townscape values through design, building materials and siting of development and land uses rather than prohibition of development and land use.

In order to respect their origins and traditional roles, future development will contribute to the unique rural community character, with traditional and heritage design elements. Adaptation of development to suit changing community needs will be also important, as these areas continue to grow and provide the services expected by the surrounding populations. One of the key outcomes is for our townships to accommodate growth that is sympathetic to rural lifestyle allowing their rural identity to flourish and to avoid becoming an extension of major urbanised environments. The potential threat of urbanisation is becoming more apparent as new urban areas in the area are identified and pressure for urban growth in outer metropolitan areas continues.

Development should retain and enhance the unique character and identity of each place, to support social interaction, liveability, self-containment and tourism. The role and function of rural townships is to be thriving hubs of community and economic activity, providing an alternative to urban lifestyles, and providing tourism and recreation opportunities at a local and regional level.

The rural areas together with their rural townships are encouraged to become more self-contained, in terms of economic activities and housing choices available to existing and future residents while retaining rural character and identity, environmental and scenic landscape values and the health of ecosystem services in these areas.

The Township zone code seeks to protect the identity and unique sense of place that has developed in these historical settlements. The character of the townships is to be maintained by reinforcing its existing scale, massing, fabric and types of land-uses. Small rather than large developments will be preferred. Improvements to the streetscapes i.e. more interesting “spaces”, the addition of significant and mature street trees, and the installation of period street furniture will assist in reinforcing the preferred character. The way in which elements are designed and treated will dictate the impact of an area's character.

Land in the Township zone is included in one of four precincts. Zone precincts provide greater clarity about the types of development intended in a particular location. These precincts are briefly described below.

2.1. Township centre precinct

Places recognised as community, retail and commercial service centres. Uses include shops, service industry, office, short-term and temporary accommodation, community care centre, community use, and dwelling unit and dual occupancy if associated with a community or commercial use.

The Township centre precinct is located in Woodford, Dayboro and Samford.

2.2. Township convenience precinct

Places providing convenience, small scale local services, commercial and retailing uses including shops, health care services, offices, service industry and community uses.

Wamuran

D'Aguilar

2.3. Township residential precinct

Residential areas where the existing scale, density and character are maintained and consistent with a country town. Uses include dwelling house, dual occupancy on larger lots or community care centre, multiple dwelling, residential care, retirement facilities and short-term accommodation where close to a Township centre precinct.

Dayboro

Samford

2.4. Township industry precinct

Low impact and service industry areas supporting local employment and service providers to the surrounding rural areas. Uses include low impact industry, medium impact industry (in appropriate locations), rural industry, service industry, warehouse, hardware and trade supplies and outdoor sales of agricultural machinery.

Dayboro

3. Township Centre and Convenience Precincts Character

The Township centre precinct seeks to provide places for businesses, community activities, services and facilities to contribute to the social cohesiveness and economic vitality of the rural townships. This precinct reinforces the sense of rural identity, community and character and supports the rural areas of the region.

The Township convenience centre precincts seeks to provide convenience services at a smaller scale than the Township centre precinct, however this precinct still supports the rural areas of the region and reinforces the sense of rural identity and character.

The unique rural community character of areas and buildings within the Township centre and convenience precincts will be enriched through the following elements:

a) active frontages and main street;
b) inviting public parks and squares;
c) prioritising pedestrians and active transport;
d) traditional rural building form and roof styles;
e) rural elements, detailing and materials;
f) protection of landscapes including long distance vistas and panoramas; retention of mature trees and native vegetation;
g) low intensity and small scale;
h) ensuring the entrance to a township retains a 'gateway' or sense of arrival that is welcoming and distinguishes the township as a rural community.

The following describes and illustrates key features related to the performance outcomes in the Township centre precinct code and Township convenience precinct code.

3.1. Active frontages

An active frontage is a concentration of activity or goings-on at the front of a site or building, adjoining a public space such as a street or park. Active frontages make a public space interesting and encourage people to linger and stay. To be an active frontage, many elements must be combined to ensure the space is interesting, inviting, walkable and safe. A key component to active frontages is the use itself; activities such as shops, small offices and cafes promote the most active street fronts.

Generally, buildings should be built to align with the street as a way of reinforcing the traditional character and improving pedestrian amenity and activity at the street level. In some cases, buildings could be setback from the street alignment to create a square or a forecourt or to provide outdoor dining. Residential buildings and mixed-use buildings can also activate the street by providing a clear address, direct access from the street and direct outlook over the street.

Where an existing building is being utilised, it is important to orientate the use or activity towards the street and/or public space to contribute to the level of activity in the public space. This can be achieved by ensuring the access is clear and welcoming with direct footpaths, landscaping, activities that lead you to the building, and through incorporation of traditional streetscape elements such as awnings, artwork and street furniture with a heritage look.

The success of a park or square is often defined by the buildings and activities that frame the space. In this regard, it is important to ensure that buildings and activities fronting these spaces invite people to spend time in the space. For example, a square is the ideal place for outdoor dining, away from the noise of busy roads. People in restaurants and cafes spilling out into the square will make the square a more exciting and safe place to be. The edges of a public square are also important for people to stop and see what is happening and gain protection from inclement weather. The buildings around the edge of these spaces must be interesting and encourage people to linger outside, providing places and reasons to stop.

Development or re-development within a Township centre precinct and Township convenience centre precinct should incorporate the following design and activity features:

a) active ground-floor uses located at the same level as the footpath;
b) the use of clear glazing in building facades for all non-residential ground-floor uses to increase passive surveillance and add to the sense of street activity;

c) building frontages orientate and run parallel to the street alignment or public space they adjoin to provide access to the street frontage, public space or area of pedestrian activity;
d) building design and form should be carefully considered and include appropriate design responses to facilitate active frontages; facades should include traditional character and visual interest elements;
e) a 'fine grain' of uses and smaller tenancies that will allow for a greater diversity in activities and add to the character, such as smaller retail spaces, 'hole in the wall' shops/cafes, temporary stands, pop-up retail, performance spaces and other innovative uses of space;
f) car parking is not located in front of the building and does not dominate the streetscape;
g) larger tenancies should include multiple entrances with at least one entrance per street frontage.

Examples of good street activation e.g. uses on footpath level, frontages orientated towards the street, traditional building design, and on-site car parking not dominating the frontage.

Examples of non-activation caused by car parking being the dominant frontage feature.

3.2. Streetscape

The importance of the streetscape in creating functional and attractive townships needs to be recognised. The planning scheme places a high importance on main streets forming the core of townships, with the intent being that this will then flow on to increased productivity, economic and community benefits. A main street usually refers to a vibrant and active street with a continuous row of shops, small office spaces and restaurants. Main streets are usually located along a recognised major thoroughfare. Retail and commercial uses should be focused around the main street and decentralisation of shopping activity away from the main street should be avoided.

Examples of Township main streets. Main streets contain traditional character features (e.g. street furniture, mature vegetation, etc.) as well as a high level of street activation.

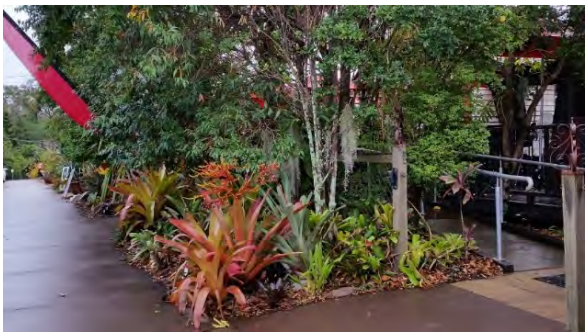
Walkability is an important feature of successful townships. Walkable towns are generally defined by their:

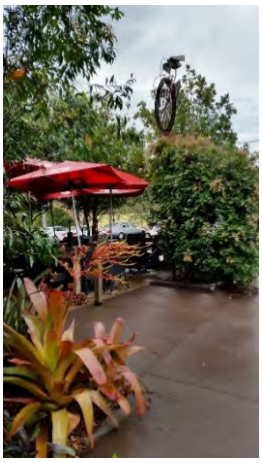
a) safe, navigable and attractive walking environments, by ensuring public areas are shaded, activated, have clear sightlines, good lighting and places to rest;
b) connected/permeable pattern of public and private spaces;
c) access points to cater for all users, including; older people, children and people with disabilities;
d) mix of activities that provide opportunities for multi-purpose trips.

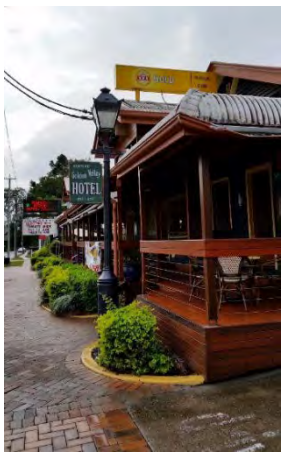
Trees in the streetscape not only provide welcome shade and shelter for pedestrians but enhance its visual appeal by complementing the built environment and adding a changeable element that provides colour and texture. Street plantings can also provide a sense of enclosure and a sense of place for particular elements of the street. They can humanise the scale of the street be detracting from the wide expanse of the road reserve and help reduce the scale of larger buildings within the streetscape. Feature trees can also consolidate the character of towns, as seen in Dayboro.

The retention of established trees on private property where they contribute to the character of the townships, is strongly encouraged. The use of indigenous plant species in landscaped areas is also encouraged. Hard landscaping embraces a range of built elements which occur between buildings and in public spaces. This includes street furniture, water fountains, pathways, pathway treatments, roads, rest areas, barbecues, play equipment, fences and picnic shelters.

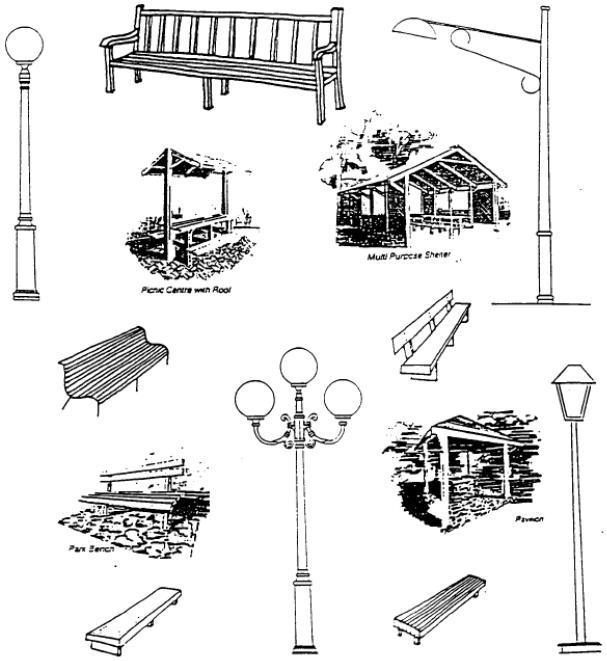
Streetscape features should be predominantly of natural materials, functional and low maintenance and have a more traditional feel. They should also have a consistent feel and character in order to make up the total streetscape. Streetscape features may be made of non-natural materials with a traditional timber look to assist in reducing costs and maintenance, particularly in areas away from the main street.







Woodford and Samford



Examples of appropriate styles of street, park furniture, structures.

Key sites are locations within a township that have a high degree of visibility and have the opportunity to contribute to the visual interest and traditional rural township character of the place. Key sites are often located on corners and particularly at the entrance to the centre. It is important that the entrance to a township retains a 'gateway' or sense of arrival that is welcoming and distinguishes the township as a rural community. Key sites should be carefully developed to contribute to the character and richness of the centre through the inclusion of landmark elements and feature building entries. Furthermore, prominent corners should have attractive active frontages facing both directions in order to create interesting space.

Crown Hotel provides a good example of the distinct character of the town and is located on a key site.

Woodford Village Hotel is located on a prominent corner and successfully contributes to the visual interest and traditional rural township character of Woodford.

A view is a range of vision while vistas are a view seen through a border, for example along a narrow avenue or between a row of trees, or a distant scene or panorama. Views or vistas can be directed to water, open space, picturesque natural areas such as mountains or farmlands, across a centre or to a landmark. A view or vista can announce the arrival to a township and reinforce the country town character providing a sense of location and place. Views and vistas should align to highlight the context or surrounds of a place and to improve legibility.

Views of both the urban and natural environments should be identified and analysed before designing site layouts to take advantage of them. This is primarily achieved by maintaining the sightlines between places and preserving the ability to see a landmark as a focus of the view.

An example of a typical township vista with mountain ranges in the background.

3.3. Built form

The design of buildings should be appropriate to the place in which they preside. Built form provisions are utilised to achieve particular design outcomes to enhance local character. The traditional scale of a streetscape can be diminished if buildings significantly exceed surrounding building height, present large unarticulated facades or interrupt the rhythm of setbacks or roof lines. The design and form of buildings within a Centre or Convenience precinct need to be carefully considered to add to the traditional character and appearance of a main street and centre, providing pedestrian comfort, increasing the use or usability of a centre, make public spaces interesting and encouraging people to stay, increasing the safety (casual surveillance) as well as providing visual interest. To effectively achieve all of these objectives building design requires a number of factors to be considered with the most appropriate design response implemented. Factors and examples of design responses include, but are not limited to:

a) consistent building alignments and a defined public domain;
b) build to the street frontage, unless setbacks are required for on street dining or a public plaza or public open space;
c) uniform human scale, traditional building form and architectural styles, awnings, etc;
d) breaking up larger buildings into modules with the use of windows or balconies that are grouped or separated to create a pattern or rhythm;
e) use of traditional roof forms including medium pitched pyramids, hips or gables;
f) use of lightweight external elements to reduce building bulk and respond to local climatic conditions such as awnings, parapets, eaves, sunhoods, verandahs, louvres, fretwork, stained glass, ornamental panels, lattice screening, balustrades;
g) use of traditional building materials including painted timber in traditional subdued colours and corrugated iron;
h) conceal or screen service areas and equipment (e.g. service plants, vent stacks, telecommunication infrastructure, gutters, downpipes and signage) from primary frontages.

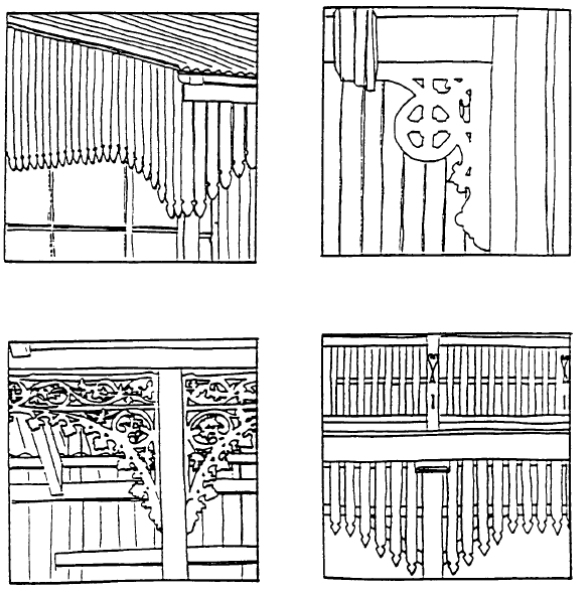
The following describes and illustrates key features related to the performance outcomes for built form.

3.3.1. Awnings and verandahs

Awnings are a typical inclusion on traditional commercial buildings and are both a functional and attractive addition. New development should incorporate awnings which extend for the full frontage and as far as possible to link into any abutting awnings so as to facilitate unbroken weather protection. Verandahs can be a desirable feature of two storey development.

Awnings should be incorporated with cantilever structural supports. Down-posts can be either simple or ornate and should be set back at least 600mm from the face of the kerb. In the case of two storey buildings the second storey should incorporate features such as verandahs, cornices, pilasters, recesses and projections.

An example of an awning extending the full frontage of the premises, providing unbroken weather protection.



Conceptual styles of preferred awning and verandah design in the Township zone.

3.3.2. Roof form

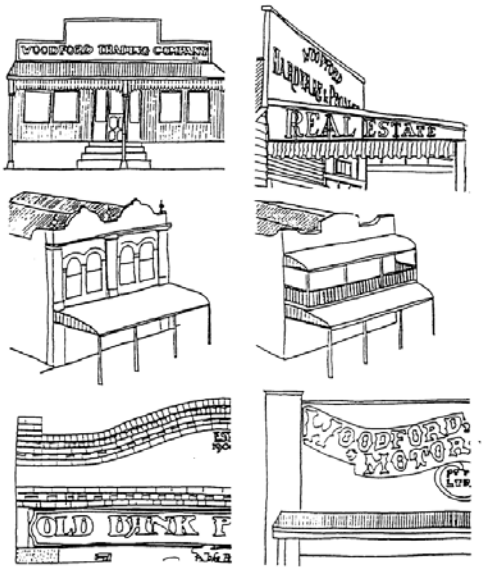
The roof-line is one of the most important features determining the overall appearance of the building. Steep pitched (between 30 and 45 degrees) gables and hip roofs are preferred form. Where the width to be spanned by the roof is in excess of about 7.0 metres, multiple hips or gables or the addition of skillions is traditionally used. Examples of typical vernacular roof designs are shown below:

Examples of appropriate roof forms and shapes in old and new buildings.

3.3.3. Parapets

Parapets are a conventional inclusion in the façade of traditional commercial buildings and serve as an identifier for the premises (generally where the name of the building or the business would be located/signage). Parapets vary from the simple to the relatively sophisticated. Pilasters are often used for support and ornamentation.

An example of a commercial building containing a traditional parapet.



Conceptual styles of preferred parapet designs.

3.3.4. Windows and doors

The emphasis with window and door openings in traditional buildings is the repetition of vertical lines and rhythm. A similar design emphasis should be incorporated in new buildings. Where large expanses of glass are required (such as display windows) vertical mullions, posts rails or other detailing should be used to break the expanse and suggest a vertical orientation of windows.

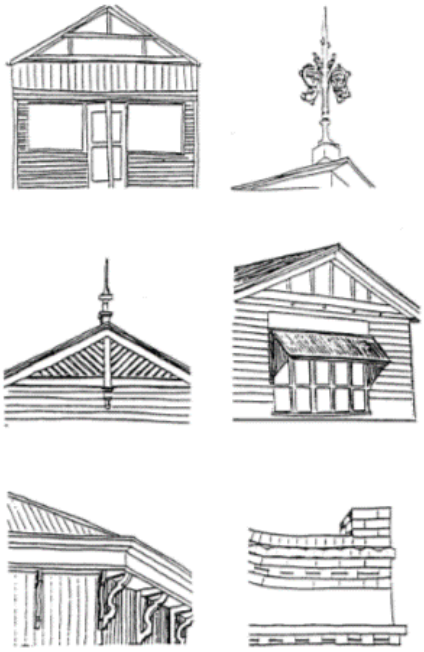
A similar vertical emphasis is sought with door openings. Double doors were often incorporated in traditional buildings. Embellishment of doors with window panels or sidelights and semi-circular fan lights assists in providing a traditional facade.

Examples of preferred window and door detail styles. Doors are normally inset with a small landing, as shown in both examples above.

3.3.5. Detailing

Traditional buildings often include functional and decorative features such as window hoods, louvres, slats, shutters, ornamental panels and brackets, finials, gable vents, fretwork and stained glass. The inclusion of a combination of these features complements the built form and streetscape.

An example of a commercial township building incorporating traditional detailing.



Conceptual styles of preferred building designs.

3.3.6. Materials and Colours

Materials used should as far as possible be consistent with those traditionally employed. Timber with iron roofing is preferred, however, suitable variations may prove in keeping with the established style. Colours chosen should be traditional and successfully blend with surrounding buildings. Mid tone hues are preferred.

3.3.7. Signage

Criteria for signage, where regulated by the Planning Scheme, is located in Section 9.4.4 Advertising devices code. See Planning scheme policy - Advertising devices for guidance on how to achieve assessment criteria for signage within the Township zone.

3.4. Car parking and service areas

Car parking and service areas need to be carefully considered to ensure they do not dominate the streetscape or prevent the achievement of active and walkable centres. Townships rely heavily on the appropriate (not necessarily high) number of car parking spaces and the careful location and design of car parking areas. Design solutions for car parking areas are discussed below.

3.4.1. On-site parking and service areas

On-site parking should be located to the rear of the site or away from the street frontage to reduce negative impacts on the streetscape by maintaining active uses at the street and areas of public realm. On-site parking should be well screened and landscaped with plantings between parking bays to provide screening and improve the appearance as well as reduce heat loads from the car park surface and reflectivity from cars.

Parking and service areas at the frontage of a site should not dominate the streetscape.

Car parking should be located at the rear of the site and service and storage areas should be screened so they cannot be viewed from the street.

4. Township Residential Precinct Character

The Township residential precinct seeks to protect and strengthen the traditional character and unique sense of place in the township residential areas. Rural townships contain predominantly low-rise, detached Dwelling houses on larger residential lots. Other residential uses are encouraged to provide diversity and housing choices in the rural townships where they are able to retain a spaciousness that reflects the country town setting and are in proximity to existing commercial, retail and community uses. Residential development should reflect the existing rural community character and maintain community identity and the village feel of rural townships.

Woodford

Dayboro

Woodford

The unique rural community character in the township residential areas will be enriched through the following elements:

a) traditional township building scale and form and roof styles;
b) heritage design elements and detailing, traditional colours and lightweight materials;
c) protection of landscapes including long distance vistas and panoramas;
d) retention of mature trees and the use of indigenous species to break up building mass;
e) absence of front fencing or the use of open farm style front fencing;
f) minimal site disturbance through the provision of building design to follow the contours of the site or step down the site.

4.1. Character

The traditional scale of a streetscape can be diminished if buildings significantly exceed surrounding building height, present large unarticulated facades or interrupt the rhythm of setbacks or roof lines. The setting of new buildings can detract from the character of a street if orientation or setbacks conflict with traditional settings or if garages dominate the frontage. Insensitive use of cut and fill for building pads, slab on ground and retaining walls should be avoided, rather the use of pole and timber floored housing on slopes retains natural landscape. Traditional roof styles as detailed above at section 3.3.2 should be incorporated.

New development in the Township residential precinct should incorporate traditional township scale, form, design and front setbacks in order to achieve consistency with the surrounding township character.

Historically, township character was influenced by the limited range of materials available. The use of "timber and tin" provided a unifying theme of painted timber walls and corrugated steel roofing. Elements such as eaves, sunhoods, verandahs, lattice screens, balustrades and batten panels that cast shadows and provide three-dimensional effects assist in establishing the desired character. These lightweight external elements assist in reducing building bulk, form a transition with the external landscape and also mitigate the local climatic conditions of strong sun and high rainfall. The character of a street can be reduced by structures that do not incorporate shade-forming elements and that

present a flat facade to the street. Further information about appropriate materials and detailing to achieve desired character are discussed above in sections 3.3.4 to 3.3.6.

As detailed above in section 3.2 views of both the urban and natural environments should be identified and preserved. Residential uses should visually complement the landscape through building design. Structures located on ridgelines or hilltops should be avoided. Mature trees should be retained wherever possible to strengthen the township character and the planting of appropriate indigenous species is also encouraged. The use of exotic species is discouraged.

An example of an overuse of cut and fill, resulting in impacts on the visual amenity and landscape of the area. Dwelling houses should not be located on ridgelines or hilltops.

Dwellings that incorporate traditional township design elements (e.g. eaves, verandahs, timber and corrugated steel roofing) and colours which respect and respond to the surrounding rural landscape, vegetation and geography are preferred.

4.2. Screening - fences and walls

Fencing and screening complements the rural character and open appearance of the streetscape by:

a) avoiding front fencing or where incorporated, maintains an open appearance to the streetscape through the use of farm style fencing (e.g. post and rail or wire);
b) maintaining surveillance between buildings and public spaces.

5. Township Industry Precinct Character

A range of industrial activities are established in the Township industry precinct which are of a low intensity and scale and provide appropriate employment opportunities for the township and the surrounding rural sector. It is important industrial uses do not significantly detract from the rural community character of the township or negatively impact the amenity of surrounding areas. While the functional needs of industrial uses often require structures of a bulkier scale and greater height (e.g. up to 15m), design must be sympathetic to and contribute to townscape values.

Consideration of façade treatments, vehicle movements, parking location and prioritisation of pedestrians and cyclists will assist in protecting and enhancing the character and unique sense of place of rural townships. Unless it can be clearly demonstrated that the proposed use will have no significant negative impact on the existing or desired character of the area or the amenity of adjoining land owners, a combination of the elements suggested below should be incorporated.

Dayboro

Woodford

The traditional scale of a streetscape can be diminished if buildings present large unarticulated facades or interrupt the rhythm of setbacks or roof lines. Furthermore, the setting of new buildings can detract from the character of a street if orientation or setbacks conflict with traditional settings or if roller doors dominate the frontage. Insensitive use of cut and fill should be avoided.

Detailing such as roof overhangs, eaves, awnings and lattice assist in establishing the desired character and provide pedestrian friendly building elements. These lightweight external elements also assist in reducing building bulk, form a transition with the external landscape and also mitigate the local climatic conditions of strong sun and high rainfall.

Vehicle access should be located at one side of the development with parking located at the side or rear and screened from view of the main frontage. Car parking must be accommodated on the land and should be sited and constructed so as to minimise the impact on rural landscape character of the site and surrounding locality. Where required, roller doors for truck access are to be located out of view from the street frontage.

5.1. Signage

Criteria for signage, where regulated by the planning scheme, is located in Section 9.4.4 Advertising devices code. See Planning scheme policy - Advertising devices for guidance on how to achieve assessment criteria for signage within the Township zone.

6. References / Resources / Acknowledgements

Buckley Vann Town Planning Consultants Moreton Bay Rural Areas Strategy - Final Strategy Report January 2013.

Visual Diary Character Area Studies for Dayboro Valley and Village, Samford Valley and Village, Mt Nebo and Mt Glorious.

Caboolture Shire Plan (Superseded) - Schedule 9, Woodford Design Guidelines.

Planning Scheme Policy
Noise

For State Approval - Major Amendment 1 - December 2017

Table of amendments

Date of adoption and effective date	Planning scheme policy version number	Amendment type	Summary of amendments

Table of Contents

Planning scheme policy – Noise

Adoption
Moreton Bay Regional Council adopted this planning scheme policy on 24 November 2015.

Commencement
This planning scheme policy will take effect from 1 February 2016. Amendments to this planning scheme policy are included at **Table of Amendments** (inside front cover).

1. Introduction
This policy supports the Moreton Bay Regional Council Planning Scheme and has been made by Council in accordance with Chapter 3, Part 4, Division 2 and Part 5, Division 1 of the *Sustainable Planning Act 2009*.

1.1 Purpose
The purpose of this planning scheme policy is to provide guidance for the assessment of noise, preparation of noise impact assessment reports and development of noise management programs where required to satisfy provisions of the Moreton Bay Regional Council Planning Scheme.

1.2 Application
This planning scheme policy applies to proposed development that involves noise generating activities or noise sensitive uses. Provisions within the planning scheme identify where noise impact assessments will be required. Notes are provided throughout the zone, local plan and development codes to identify when a noise impact assessment report or noise management program may be required by Council.

Where the information required by this policy is not supplied when the development application is made, it will be the subject of an information request under the Integrated Development Assessment System (IDAS).

1.3 Interpretation
Terms used in this planning scheme policy are defined in Schedule 1 – Definitions of the planning scheme. Where a term is not defined in Schedule 1, section 1.3 Interpretation of the planning scheme applies.

2. Principles for assessing and mitigating environmental noise impacts
When assessing the noise impacts associated with a development the following principles apply:

a) Where a development involves a new noise sensitive use near an existing noise generating use (such as industry or major transport corridor), the new noise sensitive use must include mitigation measures.
b) Where a development involves a new noise generating activity near an existing noise sensitive use or land identified for future noise sensitive uses, the new activity must include mitigation measures.

To the extent reasonable to do so, the hierarchy of managing noise is:

a) by avoidance;
b) by minimising the noise;
c) by managing the noise.

Where noise cannot be avoided or minimised and mitigation measures are required, the hierarchy of noise control is:

a) control at the source;
b) control the transmission path;
c) control at the receiver.

Unless specified to the contrary, environmental noise and vibration will generally be assessed and measured in accordance with the guidelines outlined in the following *Australian Standards* or as updated:

AS 1055—1997 Parts 1 to 3—Acoustics—Description and Measurement of Environmental Noise.

AS 2107—2000—Acoustics—Recommended Design Sound Levels and Reverberation Times for Building Interiors.

AS 2377—2002—Acoustics—Methods for the Measurement of Railbound Vehicle Noise.

AS 2436—2010 Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites.

AS 2702—1984—Acoustics—Methods for the Measurement of Road Traffic Noise.

AS 2021—2015—Acoustics—Aircraft Noise Intrusion—Building Siting and Construction.

AS 3671—1989 Acoustics—Road Traffic Noise Intrusion—Building Siting and Construction.

AS/NZS 3817—1998—Acoustics—Methods for the Description and Physical Measurement of Single Impulses or Series of Impulses.

The standards for measurement of noise are contained in *AS 1055* and the Queensland Department of Environment and Heritage publication *Noise Measurement Manual*, 2nd edition.

3. Environmental noise impact assessment

The purpose of a noise impact assessment report is to describe, evaluate and analyse the impacts of noise emissions in order to provide measures for achieving acceptable acoustic amenity and demonstrating compliance with related provisions of the Planning Scheme.

3.1 Report content

A Noise impact assessment report must include the following:

a) Outline of the proposed development including:
   i. clear plans and diagrams identifying areas of activity;
   ii. description of hours of operation.
b) Identification and description of the site and existing acoustic environment – refer to section 4.3 of this policy;
c) Where relevant a comprehensive and representative inventory of noise emissions associated with the development and from other sources including:
   i. all the proposed and existing noise emission sources relevant to the development;
   ii. the sound power level or sound pressure level, how often it occurs/number of events, duration and operating times of each noise source;
   iii. the characteristics of each noise source, including low frequency, vibration, tonal or impulsive characteristics; and
   iv. whether each noise source produces steady sound or non-steady sound.
d) Noise planning criteria being utilised including a justification of choice;
e) A list of all relevant noise limits;
f) Details of the noise model and algorithms used in accordance with section 4.2;
g) Methods and assumptions for calculating the effectiveness of noise impact control measures, including the predicted attenuation from shielding by buildings, barriers, fences, walls, mounds or enclosures, in accordance with the requirements of section 4;
h) Outcomes of the assessment including:
   i. predicted noise impacts without control measures;
   ii. recommended control measures; and
   iii. predicted noise impacts with control measures implemented. See also section 6.
i) The noise level to be achieved at the boundary or specific location at the site that is necessary for achieving the relevant noise limit at the noise sensitive use or zone;
j) Conclusions;
k) Recommendations;
l) References; and
m) Calculations where feasible.

4. Environmental noise impact assessment methods

The assessment of noise impacts is to comply with the methods listed in this section, unless a justification is made to and accepted by the Council for an alternative method.

4.1 Methodology

A comprehensive description of the impact assessment methodology is to be provided.

4.2 Models

The following requirements apply to noise prediction models:

a) the assessment of proposed noise sources is to be undertaken using an appropriate noise prediction model; and
b) noise prediction models are to be calibrated by field measurement verification where practical.

A noise impact assessment report is to include detail in relation to the chosen model such as:

a) assumptions and uncertainties associated with the noise modelling;
b) details of noise model calibration method and results;
c) description of and justification for the noise model and algorithms used to predict the propagation of noise from the noise sources relevant to the development; and
d) model input data and the representativeness, accuracy and resolution of the input data, including noise source sound power levels, operating hours of each noise source, ground cover assumptions, topography assumptions, road gradient where relevant, reflections from buildings and barriers and noise source and receiver heights.

4.3 Assessment of the existing acoustic environment

A noise impact assessment report is to include a qualitative and quantitative assessment of the existing acoustic environment, which:

a) identifies the sound pressure levels of the existing acoustic environment, including the rating background level (RBL) at the development; see Appendix 1 Determining the Rating Background Level;
b) identifies the noise sources that contribute to the existing acoustic environment; and
c) describes the existing acoustic environment.

The noise impact assessment of existing noise sources is to be undertaken using noise monitoring and where appropriate, noise prediction modelling.

The following information is to be included in the noise impact assessment and report in relation to the existing acoustic environment:

a) a qualitative description of the existing acoustic environment;
b) description of the noise monitoring equipment and procedures used to assess the existing acoustic environment;
c) a site plan and/or map to scale showing relevant features such as:
    i. the location of any existing noise sources that may contribute to the existing acoustic environment including roads, railways, airports, industry and commercial premises;
    ii. the location of the sensitive uses and sensitive zones that may be impacted by noise from the development, or where the development is for a sensitive use, the location of existing noise sources that may impact the development;
    iii. the location of noise monitoring equipment used to assess the existing acoustic environment, including distance to any existing noise source that may contribute to the existing acoustic environment;
    iv. location of existing or proposed structures, including but not limited to buildings, barriers, walls and fences; and
    v. the location of any earth mounding, cuttings or other significant topographical features.
d) site photographs indicating the position of the noise monitoring equipment;
e) details of noise monitoring equipment field calibration results;
f) noise monitoring results where relevant including:
    i. sample times and measurement intervals;
    ii. weather conditions during measurement including wind speed, wind direction and rainfall preferably sourced from a portable weather station installed at the subject site or alternatively the Bureau of Meteorology weather station.

iii. adjustments for reflecting surfaces where relevant;
iv. for attended noise monitoring a description of noise sources that make up the existing acoustic environment (e.g. aircraft, industry, mechanical plant, dog barking) and discussion of extraneous noise and any effect it may have on the results;
v. table summary of measured sound pressure levels and results;
vi. graphical presentation of measured sound pressure levels using 15 minute intervals and including the L_{Amax}, L_{Aeq}, L_{A10} and L_{A90} noise descriptors. Where other parameters are referenced reasoning for their use is to be provided;
vii. methodology used for predicting sound pressure levels at locations other than those monitored; and

g) rating background levels for day, evening and night for the most affected sensitive zones or noise sensitive uses, determined in accordance with Appendix 1; and
h) existing ambient sound pressure levels, including L_{Amax} and L_{Aeq} for day, evening and night for the most affected sensitive zones or noise sensitive uses. Quantify the contribution of existing transport noise (road, rail, aircraft), industry/commerce in L_{Amax}, L_{A10}, $L_{Aeq,11hr}$, L_{Aeq4hr}, L_{Aeq9hr} for day evening and night respectively.

4.4 Modifying factor adjustments

Noise impacts at sensitive uses or sensitive zones can be greater where the source noise has the following characteristics:

a) tonality;
b) impulsiveness;
c) modulation; and
d) low-frequency content.

Modifying factor adjustments as specified in *AS1055 – 1997, Acoustics – Description and measurement of environmental noise* are to be applied to the measured/predicted source noise level at the receiver before comparison with the noise planning criteria. A noise impact assessment report is to include a description of the modifying factor adjustments made as part of the noise impact assessment and justification for their use.

4.5 Determining L_{Amax} level

As operational L_{Amax} levels can vary, the L_{Amax} is considered by assessing:

a) The arithmetic average of the maximum levels from up to 15 single events over a given night time period, 10pm to 7am; and
b) the absolute highest L_{Amax} level.

LAmax assessment only applies to 'specified noise sources' which are defined as:

a) impact noises;
b) hammering;
c) loading/unloading;
d) dropping items;
e) beepers, Alarms, Bells, Phones, Sirens;
f) power tools;
g) valve releases;
h) air brakes; and
i) door slamming.

Note — People noise and vehicle noise (engine, exhaust, induction, tires) are specifically excluded.

4.6 Vibration

a) *The descrip*tors used to define vibration are not the same as those used to describe sound. Vibration can generally be described in terms of acceleration, velocity or displacement. The most commonly used descriptor for vibration for structural damage and human comfort is velocity.

b) *AS2187.2—Explosives—Storage Transport and Use, Part 2 Use of Explosives* describes the commonly used damage criteria for buildings in terms of peak particle velocity (PPV) in mm/s. The peak particle velocity is the maximum vector sum of three time synchronised velocity components and it is measured at the ground surface.

c) Detailed analysis is outlined in *BS7385.2 B 1993 Measurement and Evaluation of Vibration in Buildings, Part 2, Guide to Damage Levels From Groundborne Vibration* which provides frequency range vibration levels. Building damage is more closely related to stress, which is related to displacement. Constant peak to peak displacement levels at differing frequencies translate to vibration velocity, which increases with frequency. Because of this, the criterion allows greater vibration velocity levels at higher frequency.

d) Cosmetic building damage from sources such as piling, construction activities, machinery or road/rail traffic is also covered in *BS7385.2*. The criteria for cosmetic damage are component levels, not PPV. Values referred to are at the base of the building.

e) For certain buildings, such as those of historical value or those containing equipment that is sensitive to vibration, vibration levels lower than those shown in the criteria may be required.

f) For human vibration comfort level assessment in buildings, *BS-6472:1992—Evaluation of Human Exposure to Vibration in Buildings (1 to 80 Hz)* describes suggested vibration levels in buildings for human comfort.

g) Continuous vibration continues uninterrupted for a defined period (usually throughout daytime and/or night-time). Continuous vibration includes: machinery, steady road traffic and continuous construction activity (such as tunnel boring).

h) Impulsive vibration is a rapid build up to a peak followed by a damped decay that may involve several cycles of vibration (depending on frequency and damping). It can also consist of a sudden application of several cycles at approximately the same amplitude, providing that the duration is short, typically less than 2 seconds. Impulsive vibration includes: infrequent activities that create up to 3 distinct vibration events per day or night period, e.g. dropping of heavy equipment, occasional loading and unloading.

i) Intermittent vibration is interrupted periods of continuous vibration or repeated periods of impulsive vibration, or continuous vibration that varies significantly in magnitude. Intermittent vibration includes: trains, intermittent construction activity, passing heavy vehicles, forging machines, impact pile driving, jack hammers. Where the number of events is 3 or fewer per day or night period, these can be assessed against impulsive criteria.

j) There is a low probability of adverse comment or disturbance to building occupants at vibration values below the preferred criteria. Activities should be designed to meet the preferred values where an area is not already exposed to vibration. Where all reasonable and practical measures have been applied, values up to the maximum value may be used if they can be justified, e.g. temporary disturbances and infrequent events of short term duration.

5. Environmental noise impact assessments – Criteria

General noise emission criteria for noise generating uses unless otherwise stipulated

Both column 1 and 2 are applicable	**Column 1 – Intrusive noise criteria**	**Column 2 – Acoustic amenity criteria**		
Criteria location	$L_{Aeq,adj,T}$ is not greater than the Rating Background Level (RBL) for Day, Evening and Night plus the value in column 1 for the relevant criteria location. These limits are component levels. "T" is either a relevant representative 15 minutes or if the duration of the noise occurs for less than 15 minutes the duration of the noise source.	Day, evening and night $L_{Aeq,adj,T}$ 1hr are not greater than the values in column 2 for the relevant criteria location.		
		Day	**Evening**	**Night**
At the boundary of a: • General residential zone • Rural residential zone • Rural zone • Emerging community zone • Interim residential precinct (Redcliffe Kippa-Ring Local Plan) • Rural living precinct (Caboolture West Local Plan) • Urban living precinct (Caboolture West Local Plan) • Township zone (Residential precinct)	3dB(A)	55dB(A)	45dB(A)	40dB(A)
External to a noise sensitive use in the following zones where the proposed use is located within the same zone: • General residential zone • Rural residential zone • Rural zone • Emerging community zone • Interim residential precinct (Redcliffe Kippa-Ring Local Plan) • Rural living precinct (Caboolture West Local Plan) • Urban living precinct (Caboolture West Local Plan) • Township zone (Residential precinct)	3dB(A)	55dB(A)	45dB(A)	40dB(A)
External to a noise sensitive use located in a: • Centre zone • Community facilities zone • Extractive industry zone • Industry zone • Recreation and open space zone • Township zone (Centre, Convenience or Industry Precinct)	5dB(A)	60dB(A)	55dB(A)	50dB(A)

Both column 1 and 2 are applicable	**Column 1 – Intrusive noise criteria**	**Column 2 – Acoustic amenity criteria**		
• Redcliffe seaside village precinct (Redcliffe Kippa-Ring Local Plan) • Kippa-Ring village precinct (Redcliffe Kippa-Ring Local Plan) • Kippa-Ring station precinct (Redcliffe Kippa-Ring Local Plan) • Local services precinct (Redcliffe Kippa-Ring Local Plan) • Health precinct (Redcliffe Kippa-Ring Local Plan) • Sport and recreation precinct (Redcliffe Kippa-Ring Local Plan) • Town centre precinct (Caboolture West Local Plan) • Enterprise and employment precinct (Caboolture West Local Plan)				

Night-time noise criteria

Criteria location		**Average of the highest 15 single L_{Amax} events over a given night (10pm-7am) period is not greater than the following values at the relevant criteria location**	
Inside a noise sensitive use within a: • General residential zone • Rural residential zone • Rural zone • Emerging community zone • Interim residential precinct (Redcliffe Kippa-Ring Local Plan) • Rural living precinct (Caboolture West Local Plan) • Urban living precinct (Caboolture West Local Plan) • Township zone (Residential precinct)		45dB(A)	
External to a noise sensitive use in the following zones: • Centre zone • Community facilities zone • Extractive industry zone • Industry zone • Recreation and open space zone • Township zone • Redcliffe seaside village precinct (Redcliffe Kippa-Ring Local Plan) • Kippa-Ring village precinct (Redcliffe Kippa-Ring Local Plan) • Kippa-Ring station precinct (Redcliffe Kippa-Ring Local Plan) • Local services precinct (Redcliffe Kippa-Ring Local Plan)		65dB(A)	

• Health precinct (Redcliffe Kippa-Ring Local Plan) • Sport and recreation precinct (Redcliffe Kippa-Ring Local Plan) • Town centre precinct (Caboolture West Local Plan) • Enterprise and employment precinct (Caboolture West Local Plan)			

Where the use involves a kennel or a home-based business the following applies:

The emission of animal noise beyond the development site does not exceed:

a) $L_{Amax,}$ 38dB(A) measured at a nearby noise sensitive use.

Where the use involves air services the following applies:
The emission of noise from air services should not exceed the Indoor Design Sound Levels identified in AS 2021:2015 Acoustics - Aircraft noise intrusion - Building siting and construction.

Licensed venues
Noise emanating from licensed premises is regulated by the Office of Liquor Gaming and Racing (OLGR). The noise criteria applied for amplified entertainment is contained in the Liquor Act 1992 (Section 187), with the subordinate Regulation (Section 28) provides a technical guideline for acoustic assessment.

A proposed development that includes a venue licensed by OLGR will be required to demonstrate compliance with the legislated criteria by way of an environmental noise impact assessment at the development application stage.

Other criteria
Notwithstanding the above listed criteria it may be relevant to reference other guidelines or legislation for example the Environmental Protection Act 1994.

5.1 Design mitigation requirements

Criteria for Material Change of Use involving a noise sensitive use:

Location where the criteria applies inside a noise sensitive use	**Adjusted equivalent continuous sound pressure level ($L_{Aeq,adj,T}$) to be achieved during day, evening and night time periods**			**Maximum sound pressure level (L_{Amax}) to be achieved during the night time period**
	Day 7am–6pm $L_{Aeq,adj,1hr}$	Evening 6pm–10pm $L_{Aeq,adj,1hr}$	Night 10pm–7am $L_{Aeq,adj,1hr}$	Night 10pm–7am
Sleeping areas	35dB(A)	35dB(A)	30dB(A)	45dB(A)
Other habitable rooms	35dB(A)	35dB(A)	35dB(A)	N/A
Within the designated private open space	55dB(A)	45dB(A)	N/A	N/A
Low-frequency noise criteria - Adjusted equivalent continuous sound pressure level ($L_{Ceq,adj,T}$) to be achieved during day, evening and night time periods.				
Noise intrusion into habitable rooms	RBL + 10dB	RBL + 10dB	RBL + 3dB	N/A

Note: when calculating attenuation from external to internal environments a maximum 7.5dB reduction is to be applied.

For development impacted by an air services use:

Buildings are to be designed to meet the Indoor Design Sound Levels identified in AS 2021:2015 Acoustics - Aircraft noise intrusion - Building siting and construction.

Notes:

- $L_{Aeq,adj,T}$: The adjusted A-weighted equivalent continuous sound pressure level of the development during the time period T, where T is an 11- hours for day (7am-6pm), 4- hours for evening (6pm-10pm) and 9-hours for night (10pm-7am), determined in accordance with the methodology described in the Noise impact assessment planning scheme policy.
- RBL: Rating background level determined in accordance with the methodology described in the Noise impact assessment planning scheme policy.
- dB(A): A-weighted decibels.
- L_{Amax}: The A-weighted maximum sound pressure level determined in accordance with the methodology described in the Noise impact assessment planning scheme policy.
- $L_{Aeq,9hr}$: The A-weighted equivalent continuous sound pressure level of the development during the night time period 10pm to 7am, determined in accordance with the methodology described in the Noise impact assessment planning scheme policy.
- Night: 10pm to 7am.
- $L_{Ceq,adj,T}$: The adjusted C-weighted equivalent continuous sound pressure level of the development during the time period T, where T is 11-hours for day (7am-6pm), 4-hours for evening (6pm-10pm) and 9-hours for night (10pm-7am), determined in accordance with the methodology described in the Noise impact assessment planning scheme policy.
- dB(C): C-weighted decibels.

Vibration criteria

Recommended intermittent vibration levels for cosmetic damage:

Type of building	**Peak particle velocity (mm/s)**		
Reinforced or framed structures; industrial and heavy commercial buildings	50 mm/s at 4Hz and above		
Unreinforced or light framed structures; residential or light commercial building type buildings	**Below 4Hz**	**4Hz to 15Hz**	**15Hz and above**
	0.6 mm/s	15 mm/s at 4Hz increasing to 20 mm/s at 15Hz	20 mm/s at 15Hz increasing to 50 mm/s at 40Hz and above.

Recommended blasting vibration levels for human comfort:

Type of building	**Type of blasting operations**	**Peak component particle velocity (mm/s)**
Residences, schools, educational institutions and places of worship	Operation blasting lasting for more than 12 months or 20 blasts or more	5 mm/s for 95% blasts per year 10 mm/s maximum unless agreement is reached with the occupier that a higher limit may apply
Residences, schools, educational institutions and places of worship	Operation blasting lasting for less than 12 months or less than 20 blasts	10 mm/s maximum unless agreement is reached with the occupier that a higher limit may apply
Industry or commercial premises	All blasting	25 mm/s maximum unless agreement is reached with the occupier that a higher limit may apply. For sites containing equipment sensitive to vibration, the vibration should be kept below manufacturer's specifications or levels that do not adversely affect the equipment operation.

Recommended levels for continuous and impulsive vibration acceleration (m/s^2) 1-80 Hz for human comfort:

Location	**Assessment Period[1]**	**Preferred values[3]**		**Maximum values[3]**	
Continuous vibration		z-axis	x and y-axes	z-axis	x and y-axes
Critical areas[2]	Day or night	0.005 m/s^2	0.0036 m/s^2	0.01 m/s^2	0.0072 m/s^2
Residences	Day	0.01 m/s^2	0.0071 m/s^2	0.02 m/s^2	0.014 m/s^2

	Night	0.007 m/s^2	0.005 m/s^2	0.014 m/s^2	0.01 m/s^2
Offices, schools, educational institutions and places of worship	Day or night	0.02 m/s^2	0.014 m/s^2	0.04 m/s^2	0.028 m/s^2
Workshops	Day or night	0.04 m/s^2	0.029 m/s^2	0.08 m/s^2	0.058 m/s^2
Impulsive vibration					
Critical areas	Day or night	0.005 m/s^2	0.0036 m/s^2	0.01 m/s^2	0.0072 m/s^2
Residences	Day	0.3 m/s^2	0.21 m/s^2	0.6 m/s^2	0.42 m/s^2
	Night	0.1 m/s^2	0.071 m/s^2	0.2 m/s^2	0.14 m/s^2
Offices, schools, educational institutions and places of worship	Day or night	0.64 m/s^2	0.46 m/s^2	1.28 m/s^2	0.92 m/s^2
Workshops	Day or night	0.64 m/s^2	0.46 m/s^2	1.28 m/s^2	0.92 m/s^2

Recommended vibration dose values for intermittent vibration ($m/s^{1.75}$) for human comfort:

Location	**Daytime[1]**		**Night time[1]**	
	Preferred value	**Maximum value**	**Preferred value[3]**	**Maximum value[3]**
Critical areas[2]	0.1 $m/s^{1.75}$	0.2 $m/s^{1.75}$	0.1 $m/s^{1.75}$	0.2 $m/s^{1.75}$
Residences	0.2 $m/s^{1.75}$	0.4 $m/s^{1.75}$	0.13 $m/s^{1.75}$	0.26 $m/s^{1.75}$
Offices, schools, educational institutions and places of worship	0.4 $m/s^{1.75}$	0.8 $m/s^{1.75}$	0.4 $m/s^{1.75}$	0.8 $m/s^{1.75}$
Workshops	0.8 $m/s^{1.75}$	1.6 $m/s^{1.75}$	0.8 $m/s^{1.75}$	1.6 $m/s^{1.75}$

Notes –
1. Day is 7am to 10pm and night is 10pm to 7am.
2. Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring.

6. Presenting outcomes

Results of the assessment are to be clearly displayed and provided in tablature form as demonstrated in the layout example below or as a set of noise level contour plots:

Receiver	Description	Source @1 metre	Correction dB (A)*	Corrected dB(A)*	Distance (m)	Barrier Height	Barrier Screening	Building TL or shield dB	Topo screening dB	Dist Att.	Noise level $L_{Aeq\ adj,\ t}$ external dB(A)	Noise level $L_{Amax\ adj,\ t}$ internal dB(A)	Complies Day	Complies Evening	Complies Night	Complies Night LAmax
	Criteria												60	56	45	50
1	Car start	77	2	79	15	2.4	-10			-14	55	55	Yes	Yes	No	No
	rattle gun															
2	Car start															
	rattle gun															

7. Noise mitigation control measures

Councils Planning Scheme identifies the use of barriers should be in accordance with the following:

Noise attenuation structures (e.g. walls, barriers or fences):

a) are not visible from an adjoining road or public area unless;
   i. adjoining a motorway or rail line; or
   ii. adjoining part of an arterial road that does not serve an existing or future active transport purpose (e.g. pedestrian paths or cycle lanes) or where attenuation through building location and materials is not possible.
b) do not remove existing or prevent future active transport routes or connections to the street network;
c) are located, constructed and landscaped in accordance with Planning scheme policy - Integrated design.

Note: Refer to Planning Scheme Policy – Integrated design for details and examples of noise attenuation structures.

Note: Refer to Overlay map – Active transport for future active transport routes.

8. Assessment of road traffic and railway noise

The following outlines the process for establishing acceptable acoustic amenity at sites impacted by noise from roads and railways.

8.1 Reconfiguring a lot

A transport noise impact assessment report is to be provided where development involves reconfiguring a lot in the General Residential, Emerging Community, Rural Residential zones and Township Residential Precinct where:

a) proposed lots are located within:
   i. 50 metres of a current or future designated sub arterial; or
   ii. 100 metres of a current or future designated arterial road; or
   iii. 150 metres of a highway or railway; or
   iv. extractive resource transport buffer.

b) where otherwise requested by Council.

Note - Does not apply if the proposed development site is within a designated transport noise corridor and the Department of Transport and Main Roads is a referral agency.

The assessment is to be in accordance with MP 4.4 of the QDC. The assessment is to identify the noise category applicable to each lot in the proposed development for both lower and upper levels. Noise categories are defined in Schedule 3 of MP4.4.

In addition the assessment is to address the requirement for residential development to have private open space that meets the Environmental Emission Criteria identified in Department of Transport and Main Roads *Policy for Development on land affected by Environmental Emissions from Transport and Transport Infrastructure Version 2 or as amended.*

Note – Noise Categories are derived from the identified noise levels at 1 metre from the façade of the proposed or existing building. For the purposes of this policy the façade is to be determined at the deemed to be building setback or proposed building envelope or the lot boundary.

8.1.1 Property notes

A property note will be applied to all new lots identified as Noise Category 1 or higher. The development approval will advise of the intended property note generally in accordance with the following example.

The following notation will be recorded on Council's property system for proposed Lots xxxxxxx

This lot is impacted by road traffic noise. A Traffic Noise Impact Report by xxxx, xxxxxx, has been prepared in relation to this lot. The report identifies this lot as being at Noise Category X. Mandatory Part 4.4 of the Queensland Development Code identifies the required noise reduction building treatments applicable to each Noise Category.

Further assessment by a suitably qualified acoustic expert should be sought in order to determine the appropriate building design and treatment required to effectively mitigate noise impacts for the provision of acceptable acoustic amenity in private open spaces and habitable rooms.

Note – where lots are impacted by noise sources other than transport alternative property notes will be applied as deemed appropriate.

8.2 Material change of use

8.2.1 Dwellings

A transport noise impact assessment report is to be provided for development proposing dwellings where:

a) a lot is located within:
   i. 50 metres of a current or future designated sub arterial; or
   ii. 100 metres of a current or future designated arterial road; or
   iii. 150 metres of highway, haulage route or railway; or
   iv. extractive resource transport buffer.

b) otherwise requested by Council.

Note - Does not apply if the proposed development site is within a designated transport noise corridor and the Department of Transport and Main Roads is a referral agency.

The assessment is to be in accordance with MP 4.4 of the QDC. The assessment is to identify the noise category applicable to each dwelling in the proposed development. Noise categories are defined in Schedule 3 of MP4.4.

8.2.2 Private open space

In addition, the assessment is to address the requirement for development to have private open space that meets the Environmental Emission Criteria identified in *Department of Transport and Main Roads Policy for Development on Land Affected by Environmental Emissions from Transport and Transport Infrastructure Version 2* or as amended.

8.2.3 Other noise sensitive uses

A transport noise impact assessment report is to be provided for other development identified as a noise sensitive use where:

a) a lot is located within:
   i. 50 metres of a current or future designated sub arterial; or
   ii. 100 metres of a current or future designated arterial road; or
   iii. 150 metres of highway, haulage route or railway; or
   iv. extractive resource transport buffer.

b) otherwise requested by Council.

The assessment is to address the Environmental Emission Criteria identified in *Department of Transport and Main Roads Policy for Development on Land Affected by Environmental Emissions from Transport and Transport Infrastructure Version 2* or as amended.

9. Noise management program

A noise management program outlines specific operational aspects of a development required to ensure acceptable acoustic amenity is provided and maintained.

A noise management program should not be used as a means for justifying how a proposed use can be compliant where an environmental impact assessment has otherwise determined that a use would not meet planning criteria.

Where required, a noise management program should be formally submitted to Council as a stand-alone document in support of a development application. Council may choose to include the program as an approved document forming part of a development permit.

A noise management program may include the following:

a) objectives;
b) noise sources;
c) noise limits;
d) responsible persons;
e) responsibilities;
f) operational aspects to be incorporated to ensure noise nuisance to surrounding uses does not occur;
g) measures for communicating the plan to relevant persons;
h) hours and days of operation (may require limitations for specific activities);
i) complaint procedures;
j) measures for administering non-compliance with the plan;
k) reporting and documentation; and
l) other aspects as directed by Council.

Appendix 1

How to determine the rating background level (RBL)

1. The rating background level (RBL) is the overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period.

2. The assessment of the RBL is to comply with the method listed in this section, unless a detailed justification is made to and accepted by Council, for any departure from the approved method.

3. Measure the L_{A90}, 1 hour background sound pressure levels for each hour during the day (0700-1800), evening (1800-2200) and night (2200-0700) assessment period relevant to the operating times and days of the development. That is, only those days and assessment periods that are applicable to the times of operation of the proposed development are required to be assessed.

4. Provided that the assessment period represents the typical background noise characteristics of the site; generally a minimum of 48 hours continuous background measurement is to be undertaken. Some situations may require further logging where the site experiences a variable background noise level.

5. Determine an Assessment Background Level (ABL) for each day (0700-1800), evening (1800-2200) and night (2200-0700) assessment period, using the tenth percentile method. The ABL is a measure of background noise (L_{A90}, 1 hour) in the absence of noise from the source. The tenth percentile method may be determined automatically using a spreadsheet package, or manually by applying the method in Table A.

Table A – Method for determining the tenth percentile

Step 1	Sort the L_{A90}, 1 hour data in each assessment period in ascending order.
Step 2	Work out the tenth percent position of the number of samples in the assessment period. This can be calculated by multiplying the number of samples by 0.1.
Step 3	Determine the tenth percentile: If the tenth percent position (from step 2) is an integer, then the tenth percentile is determined by taking the arithmetic average of the value at the tenth percent position and the value at the next highest position. If the tenth percent position (from step 2) is not an integer then the tenth percentile is the value at the next highest position. Examples: • For a data set of size 40, the tenth percent position is 4 (i.e. 0.1x40). As this is an integer the tenth percentile is the average of the values at the 4th position and the 5th position from the top of the sorted data (from step 1). • For a data set of size 44, the tenth percent position is 4.4 (i.e. 0.1x44). As the value is not an integer, the tenth percentile is the value at the 5th position from the top (from step 1).

6. Determine the Rating Background Level (RBL) to be used for assessment purposes. This is taken to be the median value of the corresponding day/evening/night ABLs. For example, for a week's worth of monitoring, the evening RBL is the median of the seven evening ABLs – i.e. the fourth highest (or lowest) value. Where this level is found to be less than 25dBA, the RBL is to be set to 25dBA. A practical example is illustrated in Table B.

Table B – Example of determining the RBL for 1-hour samples over 5 days.

	Day 1		Day 2		Day 3		Day 4		Day 5	
	Measured	**Ascending Order**	**Measured**	**Ascending Order**	**Measured**	**Ascending Order**	**Measured**	**Ascending Order**	**Measured**	**Ascending Order**
7:00	46.5	46.5	45	45	46.5	46	47	47	48	48
8:00	49.5	47.5[1]	47.5	46[1]	48	46.5[1]	49	47[1]	50	48.5[1]
9:00	48.5	47.5	46.5	46	47	46.5	48.5	47	49.5	48.5
10:00	47.5	47.5	46	46	46.5	46.5	47.5	47.5	49	49
11:00	47.5	47.5	46.5	46.5	46	47	47	48	48.5	49
12:00	49	48	48	46.5	48.5	48	49.5	48.5	50	49.5
13:00	49.5	48.5	48.5	46.5	49	48	50.5	48.5	49.5	49.5
14:00	50.5	49.5	49.5	46.5	51	48	51	49	52	49.5
15:00	47.5	46	46	47.5	48	48.5	48.5	49	51	50
16:00	48	46.5	46.5	48	48.5	48.5	49	49.5	49.5	50
17:00	48	46.5	46.5	48.5	48	49	48	50.5	49	51
18:00	47.5	46	46	49.5	46.5	51	47	51	48.5	52
ABL		47.5		46		46.5		47[2]		48.5
RBL	47[2]									

Notes -

1. Number of ascending order samples is 12. (12 x 0.1=1.2)
2. Median value of the 5 days of measurements

Note - As 1.2 is not an integer, adopt the next position: 2

Planning Scheme Policy
Operational Works Inspection, Maintenance and Bonding Procedures

For State Approval - Major Amendment 1 - December 2017

Table of amendments

Date of adoption and effective date	Planning scheme policy version number	Amendment type	Summary of amendments

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Planning scheme policy – Operational works inspection, maintenance and bonding procedures

Adoption

Moreton Bay Regional Council adopted this planning scheme policy on 24 November 2015.

Commencement

This planning scheme policy will take effect from 1 February 2016. This planning scheme policy will take effect from 1 February 2016. Amendments to this planning scheme are included at **Table of Amendments** (inside front cover).

1. Introduction

This policy supports the Moreton Bay Regional Council Planning Scheme and has been made by Council in accordance with Chapter 3, Part 4, Division 2 and Part 5, Division 1 of the *Sustainable Planning Act 2009*.

1.1 Purpose

The purpose of the policy is to notify developers and their consultants of the required procedures and responsibilities for development works and the supply of relevant documentation, as well as their maintenance period obligations and the minimum security requirements applying for the maintenance period of the completed works.

1.2 Application

This policy relates to all operational work carried out as part of, or in conjunction with, the development of land where Council will be responsible for the subsequent repair and maintenance of the completed works once they are accepted off maintenance.

1.3 Interpretation

Some terms used in this planning scheme policy are defined in Schedule 1 – Definitions of the planning scheme. Where a term is not defined in Schedule 1, section 1.3 Interpretation of the planning scheme applies.

2. Supervision of Construction Work by the Developer's Consultants

The developer is to appoint an engineer or some other suitably experienced person approved by Council's representative, to undertake each of the following inspections and all associated administrative functions, and to be the developer's representative for those matters. In addition to undertaking Mandatory Inspections, the Developer's representative is responsible for, but not limited to:

a) ensure all construction is undertaken in accordance with the Construction Tolerances as identified in Appendix C;
b) inspect all stormwater and subsoil drainage, and approve those works prior to authorising commencement of backfilling operations;
c) ensure all compliance testing is undertaken at a minimum in accordance with Appendix B, and that the results achieve the minimum requirements;
d) inspect, on a regular basis, all backfilling operations;
e) inspect, on a regular basis, all roadwork excavation and embankment operations where the rate of construction is less than 1,000 cubic metres per day and on a full-time basis where the rate of construction exceeds 1,000 cubic metres per day;
f) inspect concrete works including concrete slabs and pavements;

g) inspect and approve the road subgrade prior to authorising commencement of gravelling operations;
h) inspect and approve the road pavement prior to authorising commencement of road sealing operations;
i) inspect, on a full-time basis, road sealing operations;
j) reinspect and test the functioning of all subsoil drainage prior to authorising sealing of the road pavement;
k) ensure that all cross-road service conduits are in place and inspected prior to authorising commencement of road sealing operations and reinspect prior to the on maintenance inspection;
l) inspect all works prior to, and at on maintenance, on completion of required remedial works and at off maintenance.

The developer's representative for works inspection, supervision and associated administrative matters is to keep an accurate written record, in a form satisfactory to Council, of all times that person is present on site and evidence of that record is to be made available to Council's representative on request.

Council reserves the right to withdraw its approval at any time of the developer's nominated representative. Where Council's representative suspects, on reasonable grounds, that the required level of supervision and inspection is not being undertaken, Council will:

a) notify the developer's representative in writing of the suspected non-compliance, as soon as reasonably practicable after developing at that suspicion; and
b) refrain from accepting the works on maintenance until the issue is satisfactorily resolved.

Council reserves the right to fail any inspection and require payment of a reinspection fee if its representative concludes that any work is unsatisfactory or any correspondence submitted by the developer's representative indicating that the site is ready for an inspection is found to be incorrect. The Reinspection Fee is calculation in accordance with Council's Fees and Charges Schedule. The fee must be paid prior to reinspection.

The developer's representative must ensure that prompt action is taken to eliminate hazards or problems experienced by other parties where those hazards or problems result from the development construction activities (for example, dust issues, smoke, machinery noise before 6.30am Monday to Saturday, redirection of stormwater, and silt washing into adjacent properties). This action is to be taken at the developer's cost, even if the developer's representative is directed either verbally or in writing of such problems by Council's representative. The required remedial works may involve undertaking temporary engineering works acceptable to Council. (Any verbal direction given by Council's representative will be confirmed in writing as soon as reasonably practicable after the initial direction is given.)

Where immediate action is not taken to eliminate identified hazards or problems, Council may undertake any necessary permanent or temporary remedial works at the developer's risk and expense and may recover the costs of those remedial works from the developer as a debt payable on demand. Until payment is made, those costs will constitute a charge upon the land.

3. Works Undertaken by Energex, Telstra, Water Service Provider and Other Public Utility Providers

Unless otherwise permitted by Council, all works required to be undertaken by, or on behalf of, Energex, Telstra, a water service provider or some other public utility provider in connection with providing services to the development are to be completed prior to acceptance of the development works.

With regards to off maintenance, if works that had previously been accepted on maintenance by Council are damaged by subsequent work, and the public utility provider does not accept liability for restoring those works, responsibility for reinstatement to the satisfaction of Council's representative transfers to the developer. The reinstated works may be subject to a separate maintenance period, and a sufficient part of the maintenance bond will continue to be held by Council until the restoration work is satisfactorily completed and accepted off maintenance. The value of the maintenance bond for the reinstatement works will be calculated in accordance with the maintenance bond requirements of this policy.

4. Maintenance Requirements and Security

Council will only accept works on maintenance if the following requirements have been met:

a) a successful on maintenance inspection has been undertaken with Council's officers and the developer's representative (including acceptance of any remedial works);
b) all on maintenance documentation has been submitted and accepted;
c) maintenance bond (or request to reduce Uncompleted Works Bond) has been submitted and accepted;
d) power supply and street lighting have been energised.

Council shall accept all the works (except deferred works) from the same date. Council will not consider accepting individual elements of the works on maintenance separately. The date of on maintenance acceptance is taken to be the date of the successful inspection or the date the last maintenance document was accepted or the date the maintenance bond is accepted by Council, whichever is the latest.

4.1 Maintenance Documentation

Prior to an inspection with Council, the developer's representative must undertake an inspection of the works and submit any relevant documentation confirming that all aspects of the works have been completed to a standard appropriate for acceptance by Council. Prior to (at least 7 days before) the on maintenance inspection with Council, submit to Council:

a) a request for on maintenance form signed by RPEQ (Appendix H);
b) preliminary ADAC compliant asset data files created from a copy of the ADAC compliant Design xml file using all relevant as constructed information in accordance with Council's ADAC asset capture guidelines (https://www.moretonbay.qld.gov.au/adac/). The ADAC as constructed file must share the same unique scheme Global Feature 'ObjectID's' as like for like assets in the 'Design' ADAC xml file;
c) preliminary as constructed drawings in PDF format;
d) the bill of quantities for landscape works, including (as a minimum) the area of garden beds (including bio-retention areas), area of turf within the park, and number of street trees;
e) a high definition Closed Circuit Television (CCTV) recording of all stormwater pipes including inter allotment roofwater drainage to clearly display all joints (full surrounds) and any form of damage or defects. The recording is to include a report signed by an RPEQ stating that the recording has been reviewed and all works are satisfactory. Where defects have been identified, consultant is to provide method of rectification to Council for approval, prior to carrying out any rectification works; and
f) copy of construction costs (certified by an RPEQ) for determination of maintenance bond amount.

Prior to any development works being accepted on maintenance the developer's representative must submit and have approved the following documentation:

a) final accepted ADAC compliant asset data files in accordance with Council's ADAC asset capture guidelines (https://www.moretonbay.qld.gov.au/adac). The ADAC as constructed file

must share the same unique scheme Global Feature 'ObjectID's' as like for like assets in the 'Design' ADAC xml file;

b) as constructed drawings in PDF format, certified by RPEQ, in accordance with Council's certification wording, in accordance with Appendix F;
c) as constructed drawings in PDF format, certified by a suitably qualified licenced surveyor, in accordance with Council's certification wording, in accordance with Appendix G;
d) test certificates for compaction, material quality, strength, etc. in accordance with Appendix B, including a plan identifying the locations where testing has occurred;
e) completed checklists in Appendix D and Appendix E;
f) instruction manuals for infrastructure, e.g. Gross Pollutant Traps; and
g) documents listed in Approval Conditions as required prior to on maintenance.

4.2 Maintenance Period and Bonding Requirements

4.2.1 Maintenance Period

All operational work covered by this policy is subject to a maintenance period of 12 months unless otherwise stated in a condition of development approval, a condition of a compliance permit, or a written agreement with Council. The maintenance period commences at the date identified in the written notification sent be Council's representative. The acceptance of the work on maintenance is subject to all conditions set in the notification of acceptance and receipt of the pre-requisite security and works documentation.

4.2.2 Maintenance Security

The security required as the maintenance bond is to have a monetary value equivalent to 5% of the agreed construction cost of the development work or $2000.00, whichever is greater, and is to be in a form acceptable to Council. Guidance on what constitutes an appropriate form for security in this context is provided in Council's policy on the provision of financial securities.

4.2.3 Maintenance Period Obligations

The developer's representative must inspect the works for defects at least once every 3 months during the maintenance period. Appendix I - Subdivision Maintenance Inspection Report is to be submitted to Council after each inspection. During the maintenance period, any defects which are both evident and directly attributable to any cause (including design, workmanship or materials) from the developer's works are to be remedied by the developer in the manner directed by Council's representative. Any direction to undertake remedial works will indicate in what respect the works are defective and the date by which the necessary remedial works must be completed. Where it becomes necessary for remedial works to be undertaken during the maintenance period, a separate maintenance period of 12 months, commencing on the date on which the remedial work is accepted by Council's representative, will apply to those remedial works unless otherwise approved by Council's representative.

If any defect is not remedied within the time specified by Council's representative in either a written direction to undertake remedial works or a subsequent agreement between that representative and the developer' representative, Council may remedy the defect at the developer's risk and expense, without prejudice to any other rights which the Council may have against the developer in respect of that defect. Council may use the maintenance bond to pay the costs and expenses incurred by it in undertaking the remedial work and any shortfall may be recovered from the developer as a debt payable on demand. Until any shortfall is paid in full, it will remain a charge upon the land.

4.2.4 Off Maintenance and Extended Maintenance Periods

Prior to requesting any off maintenance inspection, the developer's representative is to have inspected the works and confirmed that they are in a satisfactory condition and submitted the necessary documentation to Council, including duly completed Appendix J - Request for Off Maintenance form and a copy of the three monthly inspection reports. Where the need for remedial works is identified during the off maintenance inspection, the maintenance period may be extended by a term commensurate with the size and nature of the identified defects. Generally, an extension of 3 months

will apply unless Council's representative believes that a longer time period is required to ensure that all works are performing satisfactorily and will not pose an unreasonable future maintenance problem for Council.

Council shall accept all the works (excepting works subject to extended maintenance periods) off maintenance from the same date. Council will not consider accepting the individual elements of the works separately. Council will notify the developer's representative, in writing, that the works are satisfactorily completed and confirm the off maintenance acceptance date. Council undertakes to release all unexpended maintenance bond security held by it against satisfactory completion of the development within one month of all required development works being accepted off maintenance. For purposes of determining the amount of any unexpended security to be returned, no allowance will be made for accrual of interest on the security for the period that it is held by Council.

4.3 Deferred Works

Some infrastructure, such as bio-retention basin planting, need to be delayed beyond the acceptance of on maintenance to avoid expensive rectification works. Only the works that do not compromise the legal or practical development for the public and that are likely to be damaged during building construction are eligible as deferred works.

Works may be deferred when these works are covered by an Agreement and Bond.

The majority of the civil infrastructure works shall be accepted on maintenance and any deferred works bonded. The value of the bond being the cost of deferred works plus 25% and subject to a separate maintenance period with the same maintenance requirements as all infrastructure works. The deferred works are considered complete when 80% build out of the development or within a maximum of 2 years from the date of the civil works being placed on maintenance. Council shall accept all the deferred works as a package meaning all deferred works are accepted on maintenance at the same time and off maintenance at the same time. As such, deferred works maintenance bonds are not eligible for release until all of the deferred works are accepted off maintenance.

Works eligible for consideration as deferred works include:

a) Bio-retention basin planting.
b) Street trees.
c) Turfing of the full verge.
d) Driveways.

5. Council Inspections and Testing Standards

It is the responsibility of the developer's representative to arrange for all inspections, testing and certifications. The developer's representative must be present during all mandatory inspections. Council's officer will not deal directly with Contractors.

5.1 Inspections

The following mandatory inspections (hold point inspections) apply to development construction works for assets to be transferred to Council and must be carried out with Council's delegated officer:

a) Subgrade/Box Inspection

The subgrade level is taken to be the full box depth as identified in the pavement approval. The subgrade will be tested at this level. Inspection of the subgrade involves a visual test and a load test.

The subgrade visual test ensures that, among other things:

- The pavement depth and width is in accordance with the approved depth and geometric design;
- The base of the box is even with specified crown and crossfall;
- The subgrade material is consistent in type and colour with the tested material on which the design was based;
- The subgrade is free from wet sports or any other visually defective areas e.g. tree stumps and other organic/inorganic matter.

The subgrade load test involves:

- Load testing with a single rear axle water cart or other approved vehicle (rollers/graders are generally not acceptable) which is driven along the subgrade at a speed equivalent to a slow walk i.e. about 2 kilometres per hour. The minimum weight on the rear axle shall be eight (8) tonne;
- Ensuring that the subgrade does not show signs of deflection which indicate a weakness in the sub strata.

b) Preseal Inspection

The preseal inspection involves a visual test and a load test. The preseal visual test ensures that, among other things:

- The pavement surface is even and complies with the design crossfall;
- The base course has been trimmed to the correct level to allow for the placement of the specified thickness of surfacing;
- The surface should be clean, coarse and tight with a stone matrix. The surface should be drag broomed beforehand so that the true surface is visible. The surface and pavement should not be excessively wet. Testing of base course gravel is required in with Appendix B prior to surfacing to demonstrate DOS <65%;
- Any kerb and channel which has been damaged during construction (including kerb which contains excessive visual defects, scraping, etc.) is to be replaced/repaired prior to the preseal inspection;
- Where new work joins to an existing sealed pavement, a saw cut edge 150-300mm into the existing pavement is to be provide to enable a smooth join to be made. Where the sequence of construction dictates otherwise and the edge is liable to be damaged prior to the placement of the AC, this may be done immediately prior to the AC being placed.

The preseal load test involves:

- Load testing with a single rear axle water cart or other approved vehicle (rollers/graders are generally not acceptable) which is driven along the pavement at a speed equivalent to a slow walk i.e. about 2 kilometres per hour. The minimum weight on the rear axle shall be eight (8) tonne;
- Ensuring that the pavement does not show signs of deflection;

c) Concrete slabs and concrete pavements;

d) Subsoil and stormwater backfilling;

e) On Maintenance Inspection:
- Civil works (roadworks, drainage, earthworks, stormwater, etc.);
- Landscaping works (parks and reserves).

f) Off Maintenance Inspection:
- Civil works (roadworks, drainage, earthworks, stormwater, etc.);
- Landscaping works (parks and reserves).

Where works are not considered to be at the appropriate standard, the developer's representative is required to provide remedial treatment and a further inspection is required with Council officers once remedial treatments have been undertaken.

5.2 Testing

The developer's representative shall be responsible for ensuring that all works are tested in accordance with the appropriate standards to the satisfaction of Council's representative. Minimum compliance testing frequencies are provided in Appendix B - Minimum compliance testing frequencies of this Planning scheme policy.

The developer's representative is required to provide a plan identifying locations where testing has occurred. The plan is to be submitted prior to acceptance of on maintenance and as part of the required on maintenance documentation (as highlighted in section 4.1 of this Planning scheme policy).

It should be noted that Council's delegated officer may vary the frequency of testing to suit site conditions but must provide written advice to the supervising engineer prior to commencement of the relevant works.

6. Stormwater assets

Council expects to receive and take ownership of stormwater assets that are in good working order and meeting their design intent. Council has a number of procedures in place to avoid the transfer of assets that function poorly and are likely to become maintenance burdens.

Vegetated stormwater assets must be designed constructed and established using best practice as described in *Healthy Waterways and Water by Design guidelines*. The guidelines provide advice on best practice processes and compliance checklists covering practical completion, compliance, bonds, on-maintenance, off-maintenance and handover.

Vegetated stormwater assets are to be handed over to Council in good condition and at an appropriate stage of development. Handover of assets to council is to be in accordance with the*, Water By Design Transferring Ownership of Vegetated Stormwater Assets* guideline and this Planning scheme policy. The handover of vegetated stormwater assets must ensure that Council is inheriting a well-functioning and effective asset.

It is expected that the sign off forms as described in the *Construction and Establishment Guidelines* will be completed by designers and construction supervisors. They must be provided to and accepted by Council prior to acceptance of any infrastructure. Should the inspections or checklists highlight the need for maintenance or rectification, the relevant Water By Design guideline should be referenced (*Maintaining Vegetated Stormwater Assets and/or Rectifying Vegetated Stormwater Assets)* and any records forwarded to Council in accordance with this Planning scheme policy.

The handover compliance checklists for the relevant asset types as described in the *Transferring Ownership of Vegetated Assets Guideline* must be completed and forwarded prior to Council accepting any new infrastructure. Inspection checklists must be provided for the following stages of developed:

- Pre-start meeting.
- Practical completion.
- On- maintenance.
- Off-maintenance.

The purpose of the inspections is to confirm that the assets have been constructed and established appropriately, the approval conditions have been met and that the assets meet the handover requirements.

The practical completion and maintenance periods may differ between the civil and landscaped elements. The timing of Council takeover is critical for vegetated assets as the largest risk to their performance is during the allotment-building phase when large volumes of sediment may choke assets.

All design and construction data is to be provided to Council in accordance with Appendix D and E of this Planning scheme policy.

Appendix A – As Constructed Information Guideline

As constructed drawings and asset information will be used by Council as a record of the constructed assets, and for their continued maintenance. Council will also provide this information to other parties where it is required to assist with identifying the location of infrastructure, connecting to existing infrastructure, to avoid damage to the infrastructure, for its alteration, or other relevant reasons.

1. Scope

1.1 Included Works

This Guideline covers the presentation of as constructed drawings and asset information for civil infrastructure including:

a) bulk earthworks;
b) road works;
c) allotment earthworks;
d) allotment conditioning works;
e) retaining structures;
f) stormwater drainage infrastructure;
g) stormwater quality improvement devices;
h) wetlands water supply mains and associated works;
i) landscaping works on public land;
j) all works generally associated with a project except as discussed in 1.2 below.

These standards shall apply to all works whether they are constructed in association with new or existing developments, and shall also apply to such works to be constructed in privately or publicly owned land.

1.2 Works Not Covered by this Guideline

Whilst this Guideline does not cover the following, the principles included in this Guideline in addition to industry professional standards and best practice should be followed for:

a) reservoirs and elevated storage tanks;
b) major pumping installations;
c) raw water delivery systems;
d) associated major infrastructure such as treatment plants, etc.

2. Preparation of Drawings

2.1 General

As constructed drawings shall be prepared by a consulting engineer or designer, or a consulting surveyor competent in each discipline associated with the project.

A consulting engineer or consulting surveyor shall certify the as constructed drawings prior to their submission to Council.

2.2 Scales

As constructed drawings are to be produced based on the suite of accepted engineering scales, or multiples of these scales. These are:

Overall Plans	1:5000	
	1:2500	
	1:1000	
Layout Plans	1:500	
	1:1000	
Longitudinal Sections	1:500	Horizontal / 1:50 Vertical
	1:1000	Horizontal / 1:100 Vertical
Cross-sections	1:100	Horizontal / 1:50 Vertical*
	1:100	Horizontal and Vertical*
Details	1:200	
	1:250	
	1:100	
Pipework and Pit Details etc.	1:100	
	1:50	
	1:20	

Although not preferred, 1:25 and 1:125 and 1:1250 may be used on occasion.

* The selection of distorted scales will depend on the cross slope of the ground and clarity required on the drawing.

2.3 Media and Sheet Sizes

All as constructed drawings for civil infrastructure shall be based on standard size sheets, the following sheet sizes being the only ones accepted:

a) A1 841 mm x 594 mm
b) A3 420 mm x 297 mm
c) A4 297 mm x 210 mm - building site plans only

2.4 Survey Datum

2.4.1 Horizontal

As constructed control shall be based on the Geocentric Datum of Australia (GDA 94) and be projected to the Map Grid of Australia 1994 (MGA 94) Zone.

2.4.2 Vertical Datum

As constructed levels shall be levelled to Australian Height datum (AHD).

3. Relatively to Design Drawings

As constructed drawings and asset information will provide all information necessary to show and describe the infrastructure as, and where, it has been constructed.

As constructed drawings and asset information shall be prepared, or checked by the consulting engineer, superintendent or project manager for the project to ensure the information is a complete and accurate record of the constructed works.

Generally, professionally produced AutoCAD based design drawings will be suitable as the basis for preparation of as constructed drawings, depending on the variation between the original design and constructed works.

Drawings produced at the design phase with the collection and presentation of as constructed information in mind may be suitable as the basis for as constructed plans and information. The validity of the design drawings must be checked for compliance with this Guideline, as their suitability should not be assumed.

Design drawings produced as standalone drawings without their future use for as constructed drawings may not be suitable as a basis for as constructed drawings.

Design drawings may not be satisfactory where Council's various standard drawings for the presentation of as constructed drawings differ from conventional design practices.

3.1 Compliance with Operational Works Permit

The operational works permit will require the applicant to submit as constructed information or drawings as a condition of the permit. Information and drawings are to be submitted in accordance with this Guideline.

3.2 Information Required for Council Projects

Design drawings prepared for Council projects should be suitable as the basis for preparation of as constructed drawings.

Where an arrangement exists between Council and another party (e.g. the superintendent, project manager, or a contractor) for the collection and supply of as constructed information, the information shall be collected and presented to Council in accordance with this Guideline.

3.3 Tolerances

Where variations have been approved between the constructed location of the works, and the design position, level and details, for valid reasons and during the construction phase of the project the drawings and asset information shall be amended to show the infrastructure in its as construction location and form. Construction tolerances are provided in Appendix C.

Any deviations outside these tolerances, as approved by Council's representative, must be shown on the as constructed drawings in accordance with this Planning scheme policy.

These tolerances have been compiled from a number of specifications and publications. Variations may exist between these tolerances and those indicated in some specifications, in which case, the applicable tolerance shall be at the discretion of Council's representative.

4. Presentation of As Constructed Information

4.1 General Information

The project as constructed drawings shall include the following general information:

a) all relevant items listed in Appendix E;
b) estate or development name and stage;
c) developer's name;
d) consultant's name, address and contact details;
e) scale and scale bar;
f) drawing title and number;
g) drawing revision schedule and description of amendments;
h) locality plan (may be included on a title sheet covering a multi-faceted project);
i) legend;
j) area for indicating approval of the drawing (including amendments).

As constructed plans and asset information files are to show the true nature and extent of construction works carried out. Any ambiguities between notes or values (e.g. minimum depth etc.) are to be deleted and confirmed as actual figures.

Information on the plans submitted for approval and acceptance "on maintenance" is to be limited to only that stage or stages of the development for which approval is sought. All information for other stages shown on plan, sections or details, apart from general allotment layout and road network, is to be removed from the drawings or crossed through with the wording "**NOT IN THIS STAGE**" in large bold lettering.

4.2 ADAC Information File

Council requires ADAC information to be supplied as electronic files. Information contained in this format does not replace hard copy plans, but supplements these. The ADAC file shall contain all relevant information for each asset group. This shall be created using a recognised ADAC compliant tool using the most recent ADAC schema.

All modules in the latest ADAC schema are to be completed to represent the As Constructed attributes of the infrastructure.

4.3 Certifications

All as constructed drawings and information manuals are to include signed certificates. The certificates are to be fixed onto the drawings, and bound into the manuals. Electronic copies of drawings and manuals are to include the signed certificate.

Electronic drawings or files are to contain the consulting engineer or consulting surveyor's certification, including electronic. Certificates may be included on each drawing or file, or as a separate file supplied with and referencing the electronic file name or drawings to which it applies.

Drawings clearly identifying any change in elevation must be certified by a suitable qualified licenced surveyor. Surveyor's certification is required on plans prepared by the Consulting Surveyor. An engineer's certification will not be required on these drawings.

An engineer's certification will be required on all other drawings associated with the project. The matter of assurances between the engineer certifying the drawing and any other party collecting or presenting the information on drawings is an arrangement between those parties.

4.4 Manuals

Council requires copies of operating manuals and similar documents to be supplied in PDF file format.

5. Information Required

As constructed drawings and asset information is to be presented in accordance with Council's various sample presentation standard drawings and the following general requirements.

In general, a drawing and digital data set for a project will contain:

a) locality plan;
b) layout plan for the project;
c) layout, locations and details of existing services;
d) final allotment layout;
e) details of any "future works" designed to enable detailing of proposed work;
f) stage boundaries where applicable, or limit of work;
g) origin of levels and set out information;
h) ground level data including:
    - horizontal Datum geo-referenced to GDA 1994 MGA Zone 56;
    - vertical Datum Digital Terrain Model referenced to AHD provided in one of the following digital formats:
        - 12da file in xml or asci format;
        - DEM Tin file;
        - 3d triangulation data in DXF AutoCAD format.
    - All digital ground level files are to display 0.25m contour intervals.

The ADAC As constructed xml must be created using as constructed information in accordance with Council's ADAC Asset Capture Guidelines (http://www.moretonbay.qld.gov.au/adac) which from time to time will be amended and updated to reflect the latest version of ADAC and Council's requirements.

The ADAC xml file must share the same unique schema Global Feature 'ObjectId's' as like for like assets represented in the 'Design' ADAC xml file. The design ADAC xml file is to be provided at the approved design stage.

5.1 Allotment Works

Engineering drawings for allotment works are to include the following information:

a) clearing plans;
b) retaining walls and similar;
c) drawings showing designated building site locations;
d) allotment earthworks – extent of cut and fill. Drawings showing allotment earthworks shall include final contours over the allotment, the area over which fill has been placed designated by translucent hatching or shading, and spot depths of fill shown at not more than 15m spacing and along gullies or ridges.

5.2 Roadworks

As constructed drawings for road works are to include the following information:

a) plan of each new road;
b) detailed plan of each intersection, cul-de-sac or speed control device;
c) longitudinal section of each road;
d) cross-sections of each road;
e) standard (typical) cross-section for each road;
f) access cross-sections (where necessary);
g) noise attenuation barriers;
h) speed control devices;
i) signs and line marking;
j) other details as apply to the project.

5.2.1 Stormwater Drainage Works

As constructed drawings for stormwater drainage works are to include the following information:

a) longitudinal sections of each drain line, showing pipeline, natural surface, and pipeline details at regular spacing (nominal 20 m);
b) plan, longitudinal and cross-sections of open drain systems;
c) layout plan including the stormwater drainage system with numbered manholes and catchpits and culverts etc.;
d) inter-allotment drainage layout plan in accordance with Council's standard drawing sample;
e) drainage details including information on manholes, catchpits, culverts etc. catchment plan;
f) drainage calculations sheet;
g) detention basin details;
h) gross pollutant traps;
i) wetlands systems;
j) erosion and sedimentation control plans and details of devices.

5.3 Structural Works

Where structures and structural works form part of the project works, complete working drawings detailing all structures, (above and below ground) and structural elements are to be provided as part of the drawing set to be submitted.

By example, structures will include concrete pits for assorted valves, pipe galleries, pump stations, and other similar installations.

5.4 Landscaping Works on Public Land

As constructed drawings for landscaping works are to include the following information:

a) playground equipment;
b) playground softfalls;
c) edging;
d) gardens;
e) pathways (if not covered elsewhere);
f) lighting and security;
g) shelters;
h) BBQs;
i) park furniture;
j) paved areas;
k) irrigation;
l) underground services;
m) fencing.

6. Submission of As Constructed Information

The requirements for submitting As Constructed information to Council will depend on whether the project is part of an operation works permit, or a project commissioned by Council.

Electronic files are to be submitted on CD, DVD, USB storage device or by email.

6.1 Information Required Under an Operational Works Permit

The information required is as per the details contained with this Planning scheme policy.

6.2 Information Required for Council Commissioned Projects

Where As constructed drawings are required as part of an agreement for a project, the following information is to be provided:

a) one hard copy set of all drawings for the works (except Council standards) in accordance with this guideline. Drawings are to be original size (not reduced);
b) ADAC compliant asset data files;
c) two sets of hard copy operating manuals for pumps, multitrode controllers etc.;
d) one set of electronic drawings (AutoCAD DWG). This includes all associated files used in drawing creation and printing;
e) one set of electronic files (PDF file format) for operating manuals for pumps, multitrode controllers etc.

6.3 As Constructed Drawings and ADAC files

Any as constructed drawing or ADAC file which fails to comply with the requirements of this Guideline or which fails a validation check may be rejected. As constructed information will not be accepted, or works placed "on maintenance" until all as constructed information and presentation complies with this Guideline.

a) As Constructed Drawings and ADAC files may also be rejected after the works have been accepted on maintenance should Council's representative find they are unsuitable in any way with respect to this Guideline or contain errors or omissions.

These cases would normally come to notice during the transfer of information from the original drawings and files supplied, onto Council's information systems.

Material rejected by Council is to be duly revised, re-certified and re-submitted to Council within fourteen days.

6.4 Recovery of costs

Council reserves the right to recover any relevant costs from a consulting engineer and/or developer whom, in the opinion of the Director, Assets and Infrastructure Services Division, has not performed satisfactorily in the preparation of as constructed drawings and asset information.

Appendix B – Minimum Compliance Testing Frequencies and Required Results

Activity	Operation	Test	Minimum Frequency	Required Result
1. Clearing		Visual Inspection		
2. Ground Surface Treatment	(Product approval by Council required)	As per manufacturer's recommendations		
3. Earthworks	a) Backfill replacement of unsuitable material	Compaction (field density)	1 per 100m, or 1 per location per 500mm layer	>95% std
	b) Allotment fill	Compaction (field density)	AS3798 Table 8.1	>95% std
	c) Roadworks fill formation	Compaction (field density)	Greater of: 1 per 250m; per layer (max 200mm) or, 1 per 100m per 2 layers (max 400mm)	>95% std
	d) Minor dam embankments	Geometrics Materials Compaction (field density)	1 per 40m 1 per 200m 1 per 100m	>98% std
	e) Levees, catch banks/drains	Geometrics Compaction (field density) Geometrics	1 per 50m 1 per 100m 1 per 50m	>98% std
4. Roadworks	a) Subgrade	Soaked CBR Compaction (field density) Geometrics	1 per change of material 1 per 80m or 500m^2 min 1 per road 1 per 20m	>3 >100% std
	b) Replacement of unsuitable material	Soaked CBR Materials Compaction (field density)	1 from each source material 1 from each source material 1 per 50m^2, or 1 per location per 2 layers (max 400mm)	>CBR 15 >95% std
	c) Unbound Pavement	Lower subbase Materials CBR Compaction (field density) Geometrics	 1 per 500m^3 1 per 1000m^3 1 per 500m^2 per course or layer 1 per 20m^3	 MRTS05 type 2.5 >CBR 15 >100% std
	d)	Upper Subbase Materials	 1 per 500m^3	 MRTS05 type 2.3

		CBR Compaction (field density) Geometrics	1 per 1000m^3 1 per 500m^2 per course or layer 1 per 20m^3	>CBR 45 <100% std
	e)	Base Materials CBR Compaction (field density) DOS Geometrics	 1 per 500m^3 1 per 100m^3 1 per 500m^2 per course or layer 1 per 1000m^2 (Base Course) 1 per 20m^3	MRTS05 type 2.1 >CBR 80 >102% std <65%
	f) Subsoil Drains	Materials Geometrics	1 per 100m^3 1 per 50m	IPWEA std drawing RS-140
	g) Concrete kerb, kerb and channel, invert, etc.	Materials Geometrics Concrete Strength	1 per 500m 1 per 20m 1 pair of test specimens for 28 day test per 100 lineal metres AS3600, AS1012.9,	>N32
	h) Lean mix backfill	Materials Concrete Strength	AS3600 AS3600, AS1012.9	
	i) AC	Materials Compaction (field density) Geometrics Thickness	1 per 250t 1 per 1000m^2 1 per 20m 1 per 80m, and min 1 per road (test location 1m from crown, alternate sides)	BCC Type 2 or 3 mix BCC Type 2 >91% density BCC Type 3 >92% density
	j) Bitumen Seal	Materials (aggregate) Geometrics Materials (binder)	1 per 100m 1 per 20m 1 set per Tanker	
5. Stormwater Reticulation	a) Compaction to trench bottom	Compaction (field density)	1 per 40m (if ordered)	>95% std
	b) Bedding	Materials (sieve analysis)	1 per 200m;	IPWEA std drawing DS-030
	c) Backfill	Compaction (field density)	1 per 40m per 2 layers (max 400mm), and 1 set of tests per line (MH to MH)	>95% std
	d) Concrete Pipe	Certification of Manufacturer	to cover all pipes	
	e) FRC Pipe	Certification of Manufacturer	to cover all pipes	

	f) Manhole CI Covers and Frames	Certification of Manufacturer	to cover all pipes	
	g) Gully Grates	Certification of Manufacturer	to cover all items	
6. Sewerage Reticulation	a) Compaction to Trench Bottom	Compaction (field density)	1 per 40m (if ordered)	See Unitywater Requirements
	b) Backfill	Compaction (field density)	1 per 40m per 2 layers (max 400mm), and 1 set of tests per line (MH to MH)	See Unitywater Requirements
	c) Manhole CI Covers and Frames	Certification of Manufacturer	to cover all items	See Unitywater Requirements
7. Water Reticulation	a) Compaction to Trench Bottom	Compaction (field density)	1 per 40m (if ordered)	See Unitywater Requirements
	b) Backfill	Compaction (field density	1 per 40m	See Unitywater Requirements
8. Service Conduits	a) Compaction to Trench Bottom	Compaction (field density)	1 per road crossing (to natural subgrade) (if ordered)	>95% std
	b) Bedding	Materials (sieve analysis)	1 per 200m	
	c) Backfill	Compaction (field density)	1 per road crossing per 2 layers (if not sand)	>95% std
	d) Pipes	Certification by Manufacturer	to cover all pipes and fittings	
9. Culverts	a) Compaction to trench bottom	Compaction (field density)	1 per $50m^3$	>90% std
	b) Bedding	Materials (sieve analysis)	1 per $200m^3$	CBR 15 Gravel
	c) Cast Insitu Concrete	Materials Concrete Strength	AS3600 AS3600	N32
	d) Precast Concrete Items	Certification by Manufacturer	to cover all items	N32
	e) Backfill	Materials Compaction (field density)	1 per 25m Greater of: 1 per 20m, or 1 per 2 layers (max 400mm)	95% std
10. Concrete Works	a) Foundation Base	Compaction (field density)	1 per $50m^3$	>90% std
	b) Piles	All	AS2159	
	c) Cast Insitu Concrete	Materials Concrete Strength	AS3600, AS1012.9, AS3600, AS1012.9	N32
	d) Concrete Pavement	Concrete Strength	2 pairs of test specimens. 1 pair for 7 day test, 1 pair for 28 day	As per design

			test of each 15m^3 or part thereof or min of pair of tests per pour. AS3600, AS1012.9,	
	e) Concrete footpaths	Concrete Strength	1 pair of test specimens for 28 day test of each 15m^3 or part thereof AS3600, AS1012.9,	N32
	f) General Concrete Works	Concrete Strength	2 pairs of test specimens. 1 pair for 7 day test, 1 pair for 28 day test of each 15m^3 or part thereof AS3600, AS1012.9	As per design
	g) Manhole and Gully Concrete	Concrete Strength	2 pairs of test specimens. 1 pair for 7 day test, 1 pair for 28 day test of each 15m3 or part thereof AS3600, AS1012.9	N32
11. Road Furniture and Signage	a) Supply	Certification by Manufacturer	to cover all materials	
	b) Installation	All	Council or Australian Standards	
12. Fencing & Guard Rail	a) Supply	Certification by Manufacturer	To cover all materials	
	b) Installation	All	Council Standards	
13. Street Lighting Poles	a) Installation	Geometrics/location	All poles	
14. Other approved products		As per Council's requirements		

Appendix C – Construction Tolerances

1.	**CLEARING**				
	(a) Roadworks formation			-	0m
				+	3m
	(b) Bulk earthworks		not outside approved area		
	(c) Designated building areas		not outside approved area		
	(d) Pipelines	(i)	centreline	-	0m
				+	3m
		(ii)	not outside approved area		
2.	**BULK EARTHWORKS**				
	a) Finished levels	(i)		±	200mm
		(ii)	free drainage at not less than min. grade		
		(iii)	residential allotments not less than specified levels adjacent to rivers, creeks or other drainage features		
	b) Formation position			±	200mm
3.	**ROAD FORMATION**				
	(a) Formation level			-	15mm
				+	30mm
	(b) Box width			+	150mm
				-	0mm
	(c) Formation width	(i)	top position for cut batter	+	200mm
				-	0mm
		(ii)	toe position for cut batter	+	200mm
				-	0mm
		(iii)	top position for fill batter	+	200mm
				-	0mm
		(iv)	toe position for fill batter	+	200mm
				-	0mm
		(v)	batters steeper than 1:4 clear of service allocations		
	(d) Batter slope	(i)	not steeper than specified		
		(ii)	maximum variation to plane of cut batter	=	150mm
		(iii)	maximum variation to plane of fill batter	=	300mm
	(e) Formation limits	(i)	Trunk Collector, Sub-Arterial and Arterial road formation contained within road reserve		
		(ii)	comply with relevant verge cross-section		

4.	**UNBOUND PAVEMENT**			
	(a) Finished level	(i)	any location	+ 25mm - 15mm
		(ii)	average	± 10mm
	(b) Surface	(i)	maximum deviation from 3m straight edge	= 8mm
		(ii)	no ponding	
	(c) Crossfall	(i)	any location	+ 0.50% - 0.50%
		(ii)	average tolerance	± 0.20%
	(d) Thickness	(i)	each layer	+ 15mm - 10mm
		(ii)	total depth	± 25mm and not less than min
	(e) Match to lip level of concrete channel	(i)	for AC seal lip level minus seal thickness	- 0mm - 5mm
		(ii)	for bitumen seal	- 5mm - 15mm
	(f) Surface evenness (AUSTROADS Count Rate)			≤ 60 counts / km
5.	**SEAL**			
	(a) A.C. seal	(i)	match to lip level of concrete channel	+ 6mm - 0mm
		(ii)	thickness	
			- individual test	+ 20mm - 3mm
			- average	+ 8mm - 0mm
		(iii)	crossfall	
			- any location	+ 0.50% - 0.50%
			- average	± 0.20%
		(iv)	horizontal alignment	± 50mm
		(v)	width	
			- unkerbed	+ 150mm - 0mm
			- kerbed	no gap at channel lip
	(b) bitumen seal	(i)	match to lip level of concrete channel	+ 10mm + 5mm
		(ii)	crossfall	
			- any location	+ 0.50% - 0.50%
			- average	± 0.20%
		(iii)	horizontal alignment	± 50mm
		(iv)	width	
			- unkerbed	+ 150mm - 0mm
			- kerbed	no gap at channel lip

6.	**KERB & CHANNEL**			
	(a) Line and level			± 10mm
	(b) No ponding			
	(c) Grade not less than 0.4% slope			
	(d) Cross section dimensions			± 5mm
	(e) Maximum deviation from 3.0m straight edge			5mm
7.	**STORMWATER DRAINAGE**			
	(a) Manholes	(i)	plan position (longitudinal and lateral)	± 75mm
		(ii)	no ponding in invert	
		(iii)	top level surface	+ 25mm - 15mm
		(iv)	match to adjacent surface	
			- unpaved surface	± 25mm
			- paved surface	± 6mm
	(b) Catchpits/Gullies	(i)	longitudinal location	± 100mm
		(ii)	lateral location	± 15mm
		(iii)	no ponding in invert	
		(iv)	top surface of backstone	± 10mm
	(c) Pipework	(i)	invert level vertical	± 10mm
		(ii)	invert level horizontal	± 100mm
		(iii)	Grade	+ 1% - 0%
		(iv)	joint gap = specified gap	- 0 + pipe dia/100 or + 20mm whichever is least
8.	**INTERALLOTMENT DRAINAGE**			
	(a) Pits and chambers	(i)	plan position (longitudinal & lateral)	± 100mm
		(ii)	no ponding in invert	
		(iii)	wholly within one property	
		(iv)	top surface level relative to adjacent ground level	
			- grated	+ 0mm - 50mm
			- ungrated	± 25mm
9.	**FENCING**			
	(a) General	(i)	true to line	
		(ii)	plan position	± 50mm lateral
		(iii)	not less than specified height	
	(b) Noise attenuation fence	(i)	true to line	
		(ii)	plan position	± 50mm lateral
		(iii)	not less than specified height	
		(iv)	no gaps	

10. CONCRETE FOOTPATH

(a) Horizontal position			± 25mm
(b) Vertical alignment			± 25mm
(c) Width			+ 25mm - 10mm
(d) Surface	(i)	maximum deviation from 3m straight edge	8mm
	(ii)	no ponding	

Works constructed outside these tolerances may not be accepted on maintenance.

Appendix D – Construction Checklists

Certified registered engineer details:

Name:

Postal address:

Business phone number:

Note: Contact numbers which you provide may be used to update council's records.

Subject property information:

Street address:

Real property description (RPD) (if not sealed, please provide previous RPD): Lot: Plan:

Development/subdivision permit number:

Estate name (if applicable): Stage number:

Developer's engineer:

Developer's supervising engineer:

Developer's construction contractor:

The following checklists are to be completed by the developer's engineer progressively throughout the construction phase. The developer's engineer or his nominated inspector (approved by council's engineer) shall carry out inspections as required by council's Subdivision of Land Provisions of the Town Planning Scheme.

Note: The completed checklist shall form a record of the construction and shall be submitted to council prior to the works being accepted on maintenance.

Critical dates – approvals:

☐ Development permit issued. Date:

☐ Operational works approvals (if applicable)

- ☐ Roadworks and drainage Date: ☐ N/A
- ☐ Electrical Reticulation Date: ☐ N/A
- ☐ Landscaping Date: ☐ N/A
- ☐ Other (specify) Date: ☐ N/A

Critical dates – notifications:

Moreton Bay Regional Council (7 days prior to commencement, amended A3 drawings also required)	Date:	☐ N/A
Adjoining property owners (letter box drop, commencement date and duration, copy of notice to council)	Date:	☐ N/A
Portable long service levy paid	Date:	☐ N/A
Pre-start meeting	Date:	☐ N/A

Note: Prior to the pre-start meeting, park areas are to be pegged and delineated to ensure no clearing occurs in park.

Testing reports:

All testing shall be carried out and presented in accordance with Appendix A. The following submissions are required:

Insitu testing:	Subgrade	☐ N/A	☐ CBR	☐ Atterberg limits		☐ Densities	
	Pavement material	☐ N/A	☐ CBR	☐ Atterberg limits/grading		☐ Densities	
	Sub base	☐ N/A	☐ CBR	☐ Atterberg limits		☐ Densities	
	Base	☐ N/A	☐ CBR	☐ Atterberg limits		☐ Densities	☐ DOS
	Stormwater trenches	☐ N/A	☐ Densities				
	Concrete works	☐ N/A	☐ Compressive strength test				
	A.C. surfacing	☐ N/A	☐ Core results		☐ Marshall stability and flow		
Allotment filling report:		☐ N/A	☐ Densities				

Critical dates – works completed:

Works completed and ready for on maintenance inspections (prior to council's joint inspection date - the development's engineer is to inspect to ensure works are complete and ready for inspection):

☐ Silt management plan	Date:		☐ N/A
☐ Roadworks and drainage	Date:		☐ N/A
☐ Electrical reticulation and street lighting	Date:		☐ N/A
☐ Telecommunications	Date:		☐ N/A
☐ Landscaping	Date:		☐ N/A
☐ Gas	Date:		☐ N/A
☐ Noise attenuation works	Date:		☐ N/A
☐ Other (please specify)	Date:		☐ N/A

Contractors or major sub-contractors details:

☐ Principal contractor		Phone:		☐ N/A
☐ Clearing		Phone:		☐ N/A
☐ Earthworks		Phone:		☐ N/A
☐ Geotechnical testing		Phone:		☐ N/A
☐ Roadworks formation/pavement		Phone:		☐ N/A
☐ Road seal		Phone:		☐ N/A
☐ Drainage works		Phone:		☐ N/A
☐ Electrical reticulation		Phone:		☐ N/A
☐ Streetlighting		Phone:		☐ N/A
☐ Telecommunications		Phone:		☐ N/A
☐ Landscaping – irrigation		Phone:		☐ N/A
☐ Gas		Phone:		☐ N/A
☐ Noise attenuation works		Phone:		☐ N/A

Customer summary:

I, being a certified registered engineer, certify that the subdivision works have been completed in accordance with council's standards and requirements and that I have had the works supervised as required under this Planning scheme policy.

Nominated inspector: Date work inspected:

Certified engineer signature: Date:

Privacy statement

Moreton Bay Regional Council is collecting your personal information for the purpose of assessing your construction checklist summary. The collection of this information is authorised under the Sustainable Planning Act 2009. Your information will not be given to any other person or agency unless required by law.

Appendix E - As constructed drawings

Drawings to be supported by digital versions in one of the formats specified in Appendix A - Section 5 of this Planning scheme policy.

Certified registered engineer details:

Company:

Name: RPEQ number:

Postal address:

Business phone number:

Note: Contact numbers which you provide may be used to update council's records.

Subject property information:

Street address:

Real property description (RPD) (if not sealed, please provide previous RPD): Lot: Plan:

Development/subdivision permit number:

Estate name (if applicable): Stage number:

Compliance with development approvals issued by council:

☐ Material Change of Use development permit conditions

☐ Reconfiguring a Lot development permit conditions

☐ Provisions for adjoining development requirements

☐ Operational Works development permit conditions

Certification of engineering drawings:

☐ All engineering drawings and specifications prepared and signed by a certified or registered engineer in accordance with council's certification; Section 7 Design Manual – Design guideline No. 2; Stage number to be included next to certification. Cross out and print in block "not in this stage" through information pertaining to other stages. See Appendix A & B certification wording for engineers and surveyors certification.

Title block on all engineering drawing to contain the following:

☐ Estate name (if applicable)

☐ Developers name

☐ Consultant's name and address

☐ Drawing number and sheet number

☐ Scale with a scale bar

☐ Locality description

☐ Original of levels and location of permanent survey marks

☐ Schedule showing date and nature of amendments

☐ Drawing title

☐ Stage number (if applicable)

Title block on all engineering drawing to contain the following:

☐ Schedule showing date and nature of amendments

☐ Drawing title

☐ Stage number (if applicable

Locality plan to contain the following

☐ North point

☐ Major road names

☐ Adjacent localities

☐ Development area outlined and shaded or crosshatched

☐ Scale noted

Layout or stage plan drawings to include the following (if applicable):

- ☐ Layout of roads
- ☐ Approved road names
- ☐ Lot layout
- ☐ Lot numbers (as per survey plans)
- ☐ Stage boundaries clearly shown
- ☐ Lot dimensions and areas
- ☐ Easements
- ☐ North point
- ☐ All abandoned services that have been removed shown with a corresponding note

Roadworks plans to include the following (if applicable):

- ☐ Road names and road reserve boundaries
- ☐ Lot boundaries, including easements
- ☐ Centreline or construction line showing
    - ☐ Chainages
    - ☐ Bearings
    - ☐ Off sets if construction line is not the centreline of road
    - ☐ All intersection points
- ☐ Information for each curve including:
    - ☐ Tangent point chainages and offsets
    - ☐ Curve radii
    - ☐ Arc length
    - ☐ Tangent length
    - ☐ Super elevation (if applicable)
    - ☐ Curve widening (if applicable)
- ☐ Kerb lines, including:
    - ☐ Kerb radii (where not parallel to centreline)
    - ☐ Tangent point chainages (where not parallel to centreline)
- ☐ Edge of pavement where no kerb is constructed
- ☐ Position and extent of channelisation
- ☐ Location and details of all traffic signs, guideposts, guardrail, and other road furniture, etc.
- ☐ Pavement markings
- ☐ Catch pit, manhole and pipeline locations
- ☐ Full drainage details where not otherwise shown
- ☐ Location and levels of permanent marks or reference marks
- ☐ Concrete footpaths and cycle paths
- ☐ Location of access points, invert crossing, pram ramps, etc. and details
- ☐ North point on each plan view
- ☐ Changes in surfacing material
- ☐ Scale shown

Intersection, cul-de-sac and speed control devices drawings to include the following (if applicable):

- ☐ Road names
- ☐ Kerb levels
- ☐ Pram ramp location
- ☐ Finished surface contours
- ☐ Channelisation details including set-out details, radii, etc.
- ☐ Location of traffic signs, guide posts
- ☐ Linemarking (linemarking and signage may be shown on a separate plan)
- ☐ Speed control device details
- ☐ Section through medians/island etc.
- ☐ Details of construction methods for surfacing other than asphaltic concrete or sprayed bitumen
- ☐ Design vehicle paths shown on all LATM devices (intersections and mid block)

Road longitudinal sections drawings to include the following (if applicable):

- ☐ Road names
- ☐ Chainages on centreline (and construction line if used)
- ☐ Natural surface or peg levels
- ☐ Design road centreline levels
- ☐ Design grades
- ☐ Length and radii of vertical curves
- ☐ Chainage and levels at grade intersection points
- ☐ Chainage and levels at vertical curve tangent points
- ☐ Section through medians/island etc.
- ☐ Cut and/or fill depths
- ☐ Horizontal radii and tangent point chainages
- ☐ Kerb levels
- ☐ Total depth, and depth of pavement courses with CBR values or material used including design CBR
- ☐ Type and thickness of surfacing materials
- ☐ Road name, centreline and IP chainage of intersection side roads

Road longitudinal sections drawings to include the following (if applicable):

- ☐ Standard format
- ☐ Road names
- ☐ Road reserve boundaries
- ☐ Road centreline or construction line
- ☐ Original natural surface line
- ☐ Constructed cross section shape
- ☐ Chainage on centreline or construction line together with natural surface level or peg level
- ☐ Offset to road centreline from peg line or construction line
- ☐ Cross fall batter slopes and dimensions where these differ to that shown on the type cross section
- ☐ Side drains shown
- ☐ No “open” cross sections - i.e. design and natural surface close
- ☐ All cross sections drawn in accordance with Department of Main Roads standard format
- ☐ Typical cross section shown for each road to include:
    - ☐ Road names
    - ☐ Road reserve width
    - ☐ Road width between face of kerbs, or pavement width where no kerb is constructed
    - ☐ Verge width
    - ☐ Location and width of concrete footpath or cycle path, where constructed
    - ☐ Off sets if construction line is not the centreline of road
    - ☐ Crossfalls and/or grades of pavement, footpaths and batters etc. with offsets to change of grade point
    - ☐ Type and thickness of surfacing
    - ☐ Total depth and depth of pavement courses with CBR values of material used or refer to details on plan

Number: ____

- ☐ Position of subsoil drainage including notation regarding the extent of usage

Accessway (to lots) cross sections to include the following (if applicable)

- ☐ Cross section showing offsets to change of grades, including grades and/or levels
- ☐ Any existing car accommodation or features
- ☐ Type and details of any surfacing to the access
- ☐ Road names and lot numbers being served
- ☐ Cross sections covers the full length of any surfacing or until the access ramps meet natural surface – whichever is the greater

Pathways and bikeways drawings to including the following (if applicable):

- ☐ All pathways clearly shown
- ☐ Chicanes provided to each end of all pathways
- ☐ Concrete path shown for all pathways linking to kerb
- ☐ Bikepaths clearly shown with widths as per permit or approval
- ☐ Drainage pathways
- ☐ Drainage pathway cross section
- ☐ Verge details to ends of drainage pathways

Stormwater drainage catchment plan drawings to include the following (if applicable):

- ☐ Road name
- ☐ Existing and proposed property and road boundaries
- ☐ All catchments/sub-catchments called up according to the drainage calculation sheet
- ☐ Catchment/sub-catchment boundaries indicated by a bold line
- ☐ Proposed contours at a suitable interval
- ☐ Direction of watershed along the flow path given the longest time of concentration
- ☐ Stormwater reticulation schematic layout shown including manhole, inlet and outlet numbers (for urban catchments)
- ☐ All internal and external catchments shown to scale

Stormwater drainage detail plan to include the following (if applicable):

- ☐ Detail of pipe junctions in manholes, where pipe centrelines are offset from centre point of manhole
- ☐ Full details including reinforcing of non-standard manholes
- ☐ Catchpit and field inlet locations (chainage offset, levels, etc.)
- ☐ Manhole locations (chainage, offset, levels, etc.) or tie to property boundary
- ☐ Culvert locations (chainage, offset, levels, etc.)
- ☐ Invert levels and diameters of pipe connections from catchpits to manholes
- ☐ Road name

Roof water/inter-lot drainage plans to contain the following (if applicable):

- ☐ Road names
- ☐ Lot numbers as per survey plans
- ☐ Design surface levels
- ☐ Pit or inlet locations, surface levels and inlet and outlet invert levels
- ☐ Easements
- ☐ Roof water lines and kerb outlets under concrete footpath in verge
- ☐ Pipe diameter and type of pipe
- ☐ Pipe offset from boundaries
- ☐ House connection details, tie, length, diameter, IL and SL for each lot

Drain line longitudinal sections (if applicable):

- ☐ Longitudinal sections for each line contain the following:
    - ☐ Chainages
    - ☐ Original natural surface levels
    - ☐ Manhole and endwall chainages together with surface levels and inlet and outlet invert levels
    - ☐ Distances between manholes/catchpits/endwalls
    - ☐ Grade of each pipe section
    - ☐ Diameter and class and material of each pipe section
- ☐ Outlet works to contain the following:
    - ☐ Open drains
    - ☐ Cross sections at each peg chainage (usually 20m intervals)
    - ☐ Details of drop structures energy dissipaters, etc., (including top view, section views, etc.)

Detention basin details to contain the following (if applicable): (if applicable):

- ☐ Plan view showing locality, road name
- ☐ Sectional views
- ☐ Details of basin wall construction
- ☐ Details of outlet structures (lot and high level outlets)
- ☐ Extent of any permanent storage
- ☐ Maximum storage level
- ☐ Extent and nature of any landscaping
- ☐ Inlet and outlet details
- ☐ Base slopes/crossfall shown
- ☐ Batter slopes shown
- ☐ Scour protection shown

Silt management/runoff control works (if applicable):

- ☐ Plan layout/extent
- ☐ Typical device details/materials
- ☐ Design complies with QUDM Section 9.03.5
- ☐ Temporary and permanent works indicated
- ☐ Notes on maintenance and operation

Gross pollutant traps (if applicable):

- ☐ Plan layout/extent
- ☐ Long section and cross sections
- ☐ All materials specified/indicated
- ☐ Structural elements detailed

Noise attenuation works (if applicable):

- ☐ Earthworks/mounds - plan, sections and batter slopes
- ☐ Barrier/fence details, typical, certified
- ☐ Landscaping
- ☐ Road names
- ☐ Drainage details

Retaining walls and other building approvals (if applicable):

- ☐ Road names
- ☐ Lot numbers per survey plans
- ☐ Plan layout - extent
- ☐ Typical cross section
- ☐ Foundation details
- ☐ Drainage details
- ☐ Design and construction certified by appropriately experienced engineer

Retaining walls and other building approvals (if applicable):

- ☐ Road names
- ☐ Lot numbers per survey plans
- ☐ Plan layout - extent
- ☐ Typical cross section
- ☐ Foundation details
- ☐ Drainage details
- ☐ Design and construction certified by appropriately experienced engineer

Landscaping plans drawings to include the following (if applicable):

- ☐ Road names
- ☐ Road reserve and property boundaries together with lot numbers
- ☐ Features bounding planting areas such as pathways, medians, etc.
- ☐ Plan locations of trees and shrubs, etc. called up from the schedule including spacings or area allowed between trees and shrubs
- ☐ Schedule of plant species with botanical and common names
- ☐ The position and type of any existing trees to be retained as part of landscaping or subdivisional works generally (excluding lot works)
- ☐ Construction details of any hard landscape elements, planter boxes, retaining walls, fences, etc.
- ☐ Irrigation system details including valves, main line diameters and conduits
- ☐ Positions and extent of root intrusion barriers
- ☐ Details of improvement or modification

General earthworks (fill plan) drawings to include the following (if applicable):

- ☐ Cut and fill areas clearly shown
- ☐ Pre and post contours (legend provided)
- ☐ Road and lot layout (indicate numbers)
- ☐ Road names
- ☐ Pit burn pit locations (if applicable)
- ☐ Plan certified by surveyor

Appendix F:

I: _____ RPEQ number: _____

(engineers name)

being a certified/registered engineer and duly authorised representative of: _____

(consulting firm or company)

Hereby

- certify the information contained in this drawing is an accurate as constructed representation of the works
- accept responsibility for the as constructed information contained in this drawing
- acknowledge the as constructed information contained in the drawing may be relied on by council and others

Certification of stage: _____ by _____ On _____

(stage number) (signature) (date)

For _____

(name of company)

Note: Where consulting firms or company and stage numbers do not apply complete with N/A for not applicable

Appendix G:

I: _____
(surveyor's name)

being a certified/registered surveyor and duly authorised representative of: _____
(company name)

Hereby

- certify the information contained in this drawing is an accurate as constructed representation of the works
- accept responsibility for the as constructed survey information contained in this drawing
- acknowledge the as constructed survey information contained in the drawing may be relied on by council and others

Certification of stage: _____ (stage number) by _____ (signature) On _____ (date)

For _____
(name of company)

Note: Where consulting firms or company and stage numbers do not apply complete with N/A for not applicable

Privacy statement
Moreton Bay Regional Council is collecting your personal information for the purpose of assessing your as constructed checklist. The collection of this information is authorised under the Sustainable Planning Act 2009. Your information will not be given to any other person or agency unless required by law.

Appendix H

Certified registered engineer details:

Name: RPEQ number:

Company:

Postal address:

Business phone number:

Note: Contact numbers which you provide may be used to update council's records.

Subject property information:

Street address:

Real property description: Lot: Plan

Development/subdivision permit number:

Estate name (if applicable): Stage number:

Development engineer:

Construction contractor:

Subdivider's contact for notification of works:

Name: RPEQ number:

Postal address:

Daytime contact number:

Emergency contact number (24

Customer summary:

The following works (ticked) are fully completed and read for on maintenance inspection by council. If the works are not minor and require reinspection by council, a reinspection fee will apply.

☐ Subdivision construction checklist summary

☐ Roadworks and drainage checklist*(Attach Checklist No. 1)

☐ As constructed drawings checklist* (Attach Checklist No. 5)

☐ Test Report as per Technical Note No. 8

I, being a certified/registered engineer, certify that the works are ready for on maintenance.

Signature: Date:

Privacy statement

Moreton Bay Regional Council is collecting your personal information for the purpose of assessing your application for an on maintenance inspection. The collection of this information is authorised under the Sustainable Planning Act 2009. Your information will not be given to any other person or agency unless required by law.

Terms and conditions:

* Construction checklists are to be completed progressively by the subdivider's engineer throughout the construction phase. The subdivider's engineer or his nominated inspector (approved by council's engineer) shall carry out all inspections required by council's Subdivision Provisions of the Town Planning Scheme.

The consulting engineer shall notify council of the intended date for an on maintenance inspection. At such time the consulting engineer may be requested by council to complete any uncompleted works before an on maintenance inspection and supply council with any outstanding testing or as constructed information.

During an on maintenance inspection council will request that all minor works be completed if required and all outstanding information, including all as constructed transparencies with corrections, quality tests and checklists be submitted to council within 14 days from time of inspection.

In addition, the consulting engineer shall notify council of minor works completed by the contractor for re-inspection. If works have been completed to council's satisfaction, then all works will be accepted on maintenance from the time of on maintenance inspection.

Should any outstanding works (including all as constructed transparencies, quality tests and checklists) not be complete within the prescribed time (i.e. within 14 days from the on maintenance inspection), then council will not accept works on maintenance until these matters have been completed to council's satisfaction.

The completed checklists shall form a record of the construction (attach all appropriate checklists).

Appendix I

Certified registered engineer details:

Company:

Name: RPEQ number:

Postal address:

Business phone number:

Note: Contact numbers which you provide may be used to update council's records.

Subject property information:

Street address:

Real property description (RPD): Lot: Plan:

Development/subdivision permit number:

Estate name (if applicable): Stage number:

Contractor:

On maintenance acceptance date:

Report for month of (select relevant month of maintenance period): ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

If unsatisfactory, remedial works required are to be listed on page 2 of this report.

Roadworks and drainage (if applicable):

☐ Silt control devices checked	☐ Satisfactory	☐ Unsatisfactory
☐ Gully pits, manholes and outfalls checked	☐ Satisfactory	☐ Unsatisfactory
☐ Roofwater system checked	☐ Satisfactory	☐ Unsatisfactory
☐ Advisory sign in good condition (if applicable)	☐ Satisfactory	☐ Unsatisfactory
☐ Street signs checked	☐ Satisfactory	☐ Unsatisfactory
☐ Footpaths in good condition	☐ Satisfactory	☐ Unsatisfactory
☐ Bikeways and concrete paths checked	☐ Satisfactory	☐ Unsatisfactory
☐ Kerb and channel	☐ Satisfactory	☐ Unsatisfactory
☐ AC surface checked	☐ Satisfactory	☐ Unsatisfactory
☐ Check for trench settlement	☐ Satisfactory	☐ Unsatisfactory
☐ Segmental paving sand checked (if applicable)	☐ Satisfactory	☐ Unsatisfactory

Comments:

Landscaping (if applicable):

Crass cover achieved: % (approx.)

☐ Trees checked ☐ Yes ☐ N/A

Comments :

Remedial works required:

Remedial works required:

(Notification to council of works proposed for acceptance)

Remedial works inspected:	

(With Moreton Bay Regional Council form previous inspection)

Other comments:	

(Notify council of damage or defects for which the subdivider is not responsible)

Privacy statement

Moreton Bay Regional Council is collecting your personal information for the purpose of assessing your monthly subdivision maintenance report. The collection of this information is authorised under the Sustainable Planning Act 2009. Your information will not be given to any other person or agency unless required by law.

Appendix J

Certified registered engineer details:

Company:

Name: RPEQ number:

Postal address:

Business phone number:

Subject property information:

Street address:

Real property description : Lot: Plan:

Development/subdivision permit number:

Estate name (if applicable): Stage number:

Off maintenance request details:

Development Engineer:

Construction contractor:

On maintenance acceptance date:

As constructed drawings received by council: ☐ Yes ☐ No

The following works (ticked) are ready for off maintenance inspection by council. If the works require reinspection by council, a reinspection fee will apply.

☐ Roadworks and drainage

☐ Other:

Customer summary:

I, being a certified/registered engineer, certify that the works are ready for off maintenance.

Signature: Date:

Privacy statement

Moreton Bay Regional Council is collecting your personal information for the purpose of assessing your application for an on maintenance inspection. The collection of this information is authorised under the Sustainable Planning Act 2009. Your information will not be given to any other person or agency unless required by law.

Planning Scheme Policy
Residential Design

For State Approval - Major Amendment 1 - December 2017

Table of amendments

Date of adoption and effective date	Planning scheme policy version number	Amendment type	Summary of amendments

Contents

Adoption
Moreton Bay Regional Council adopted this planning scheme policy on 24 November 2015.

Commencement
This planning scheme policy will take effect from 1 February 2016. Amendments to this planning scheme are included at **Table of Amendments** (inside front cover).

1. Introduction
This policy supports the Moreton Bay Regional Council Planning Scheme and has been made by Council in accordance with Chapter 3, Part 4, Division 2 and Part 5, Division 1 of the Sustainable Planning Act 2009.

1.1 Purpose
The purpose of this planning scheme policy is to:

a) provide additional information in the form of images and explanatory text to provide guidance about satisfying assessment criteria identified in the planning scheme;
b) encouraging more innovative and site-specific design solutions and less 'cookie cutter' development;
c) increase stakeholder understanding of the range of housing types that fill the 'gap' between detached and attached dwellings.

1.2 Application
This planning scheme policy applies to residential uses within the following zones, precincts or local plans:

a) General residential zone, all precincts;
b) Emerging community zone, Transition precinct if on a developed lot;
c) Township zone, Township residential precinct;
d) Redcliffe local plan, Interim residential precinct;
e) Caboolture West local plan, Urban living precinct (Next generation sub-precinct), Town centre precinct (Residential north sub-precinct, Residential south sub-precinct).

This planning scheme policy may be applied to residential uses within the following zones, precincts or local plans:

a) Centre zone code – Caboolture centre precinct, Petrie mill precinct, Strathpine centre precinct, District centre precinct, Local centre precinct;
b) Redcliffe local plan – Redcliffe seaside village precinct, Kippa-Ring village precinct, Local services precinct and health precinct;
c) Caboolture West local plan – Urban living precinct and Town centre precinct.

1.3 Interpretation
Terms used in this planning scheme policy are defined in Schedule 1 – Definitions of the planning scheme. Where a term is not defined in Schedule 1, section 1.3 Interpretation of the planning scheme applies.

1.4 Who should use the Residential design Planning scheme policy
This planning scheme policy is intended to be used by developers and designers, development assessment planners and building professionals.

This document may be referred to in information requests.

1.5 How to read the Residential design Planning scheme policy
This planning scheme policy is not a prescriptive tool, it is intended to raise general awareness about housing diversity and initiate innovative design ideas and solutions.

1.6 Disclaimer

Diagrams and photos used in the planning scheme policy may not comply with all assessment criteria in the planning scheme. Some diagrams and photos have been used to illustrate a particular element and should be used as such.

Where conflict occurs between the planning scheme and the content, diagrams or images in this policy, the planning scheme prevails.

2. Residential places

The Moreton Bay Regional Council (MBRC) Place model has been used in the Strategic framework to identify and describe a series of broad scale place types, each with a distinguishing mix and intensity of uses, development forms, character, function and special qualities to guide the planning and development of the diversity of places across the region. A visual representation of the MBRC Place types is shown on the following page in a transect diagram.

The Place model includes 4 residential places, which generally translate to the 4 precincts in the General residential zone; coastal villages, suburban neighbourhoods, next generation neighbourhoods and urban neighbourhoods. These precincts are briefly described below:

a) **Coastal villages:** Characterised by their coastal location, these villages will maintain their predominantly low-density character with detached dwellings as the predominant built form.
b) **Suburban neighbourhood:** Characterised by low-density, low rise housing with detached dwellings as the predominant built form.
c) **Next generation neighbourhood:** Characterised by a diverse mix of dwelling types with convenient access to centres, community facilities and public transport. Detached dwellings on a variety of lot types and a range of attached and low rise multiple dwellings are the predominant built form.
d) **Urban neighbourhood:** Characterised by the densest forms of housing located within walking distance of a diverse range of services and activities. Attached dwellings and medium and high-rise apartment buildings are the predominant built form.

These are not the only residential areas within the region there are also residential areas in the township place type, these are identified through the Township residential precinct in the Township zone. Further, some urban and next generation place types identified in the Strategic framework are in developing or yet to be developed areas. These future communities are translated into the planning scheme through the emerging community zone. As well as some precincts and sub-precincts identified in a local plan area.

The zone and precinct outcomes and provisions within the planning scheme have been drafted to implement and realise the vision described in the Strategic framework. This has been achieved by recognising that some elements of development relate to the place and other elements relate to the use.

Place based elements:
Design elements such as setbacks, site cover, height and density vary depending on the place. For example, an urban place looks different to a coastal village which is less dense, with lower building heights and more space between buildings etc. thus requiring different assessment criteria for building heights, setbacks, site cover and density. Assessment criteria for these elements are included in the General residential zone code and zone precincts to reflect the place types in the Strategic framework. Assessment criteria for a Dwelling house are incorporated into the Dwelling house code and include place specific elements such as setbacks, site cover, height etc for a Dwelling house. These provisions are further described and illustrated in section 4 of this Planning scheme policy.

Use based elements:
Design elements that relate to the use such as private and communal open space, access ways, landscaping, fencing, building appearance and utility areas etc, are included in the Residential uses code. Some of these elements vary depending on the precinct (e.g. car parking rates, landscaping dimensions etc.), however other factors associated with these elements relate to the use, therefore they have been included within the Residential uses code. The residential uses code may apply to the centre zone accordingly; relevant rates for car parking in this zone and relevant precincts have been included.

MBRC Transect Diagram

2.1 Density

Density has been used in three sections of the planning scheme; the Strategic framework, the General residential zone code and the Reconfiguring a lot code. The Strategic framework uses a land use intensity measure of 'people and/or jobs per ha' as well as residential densities to describe the vision. The Reconfiguring a lot code and the General residential zone code utilise the measure of residential densities (e.g. dwellings per hectare).

The key focus in the Strategic framework is to plan for a future with reduced private vehicle dependence, but density is needed to support sustainable public transport and active transport networks. Research undertaken by Peter Newman and Jeffrey Kenworthy identifies a minimum threshold of urban intensity of 35 residents and/or jobs per hectare.[1] Below this intensity the physical constraints of distance and time enforce car use. Above this intensity there is a higher inclination for a range of alternative modes of transport to be used for trips more frequently.

Thirty-five (35) residents and/or jobs per hectare is a measure of activity intensity, the concentration of activities in a given area, which is related to the number of possible trip origins and destinations in an area and the energy/effort required to access goods and services within a given area. The lower the intensity of activity the furthermore people have to travel to more dispersed locations to access the goods and services they need and the greater likelihood that the only practical way of accessing those goods and services is the private motor vehicle.

The Strategic framework uses place types to convey the overall outcomes, including activity intensity, intended to be achieved in a place. This in turn gives guidance, order, and structure about the land uses, building types and densities that can be combined to produce acceptable outcomes which achieve the long-term planning aspirations of Council.

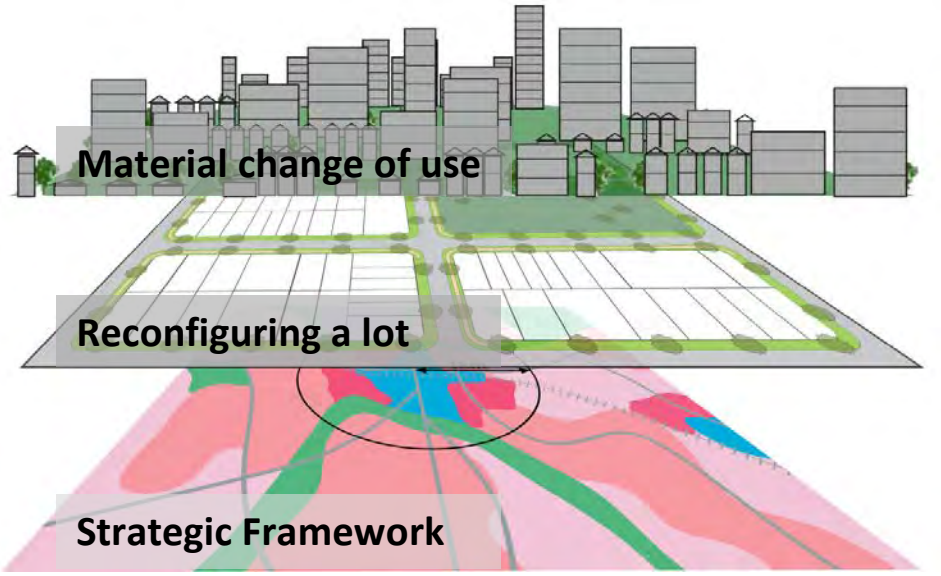
The planning scheme identifies the variety of land uses, density, building forms and lot configurations generally consistent with the intended activity intensity of each place type. Because the planning intention of Council is to gradually raise the intensity of activity in selected place types (e.g. Urban neighbourhood place type) over time to greater than 35 people and/or jobs per hectare, some place types have a specified minimum density only. This will encourage development and redevelopment that brings more people and jobs into an area. Other place types (e.g. Coastal villages and Suburban neighbourhood place types) have a maximum density specified and have not been targeted for an increase in the intensity of activity because they are not centrally located or have an established low activity intensity. In these places the remaining development opportunities are unlikely to change the intensity of activity, therefore alternative modes of transport are unlikely to become viable in the planning timeframe. Other places types (e.g. next generation neighbourhood place types) seek to avoid uniformity in built form outcomes and therefore include a specified range of possible site densities.

The table below lists the density targets used in the planning scheme for the residential place types and precincts previously described.

Density in the MBRC Planning Scheme	Residential place types - General residential zone precincts			
	Coastal Villages	**Suburban neighbourhood**	**Next generation neighbourhood**	**Urban neighbourhood**
Strategic Framework	N/A	Max 11 dwellings/ha – Net residential density	Min 15 dwellings per ha	60 people and/or jobs per ha (for people this equates to a minimum of 30 dwellings/ha – Net residential density)
Reconfiguring a lot code, Precinct overall outcomes	Max 11 lots/ha - Net residential density	Max 11 lots/ha – Net residential density	11-25 lots/ha – Net residential density	N/A lots/ha - *must not compromise the precincts future ability to achieve a minimum site density of 45 dwellings per hectare.
General residential zone code, Precinct overall outcomes	Max 15 dwellings/ha – Site density	Max 15 dwellings/ha – Site density	N/A	Minimum 45* or Minimum 75* dwellings/ha – Site density **Refer to zone code to determine applicable minimum density required.*

[1] Newman, P. and Kenworthy J. 2006 Urban Design to Reduce Automobile Dependence, Opolis Vol. 2, No.1 pp. 35-52

To achieve the land use intensity described in the Strategic framework, reconfiguring a lot density and material change of use density occurring at the site level are layered together and combined with other planning provisions for non-residential land uses like parks, schools, centres and neighbourhood hub's to create a land use intensity envisaged by the Strategic framework.



Densities sought in the Reconfiguring a lot code for the Coastal villages, Suburban and Next generation neighbourhood precincts are expressed as a number of lots per hectare rather than dwellings in recognition that at the reconfiguring a lot stage it is not always possible to know the ultimate development of each lot. However, density outcomes for reconfiguring a lot in the Urban neighbourhood precinct are different to the other precincts as the precinct will require either very small lots or very large lots to facilitate the higher densities sought. Accordingly, the outcomes for this precinct require the size of lots created ensures the minimum site density for the urban precinct can be achieved.

The densities sought in the General residential zone code appear higher than those listed in the Reconfiguring a lot code because the code expresses density as a number of dwellings per hectare. This code applies to Material change of use applications and ensures a higher concentration of dwellings on site in order to achieve the residential density or land use intensity sought by the Strategic framework.

It is important to remember that residential density is not always a reliable measure of built form intensity, nor is it the sole factor in place making. It is a tool to help inform good decision making and to help ensure objectives are met. It is not a reliable indication of how a place feels or functions.

Density targets should not be applied as a blanket control on individual sites within a broader area. This would result in monoculture rather than variety. For this reason, densities in the planning scheme are either a maximum, a minimum or include a range (e.g. 15 – 75 d/ha) to avoid their use as a 'one-size fits all' planning control.

To meet housing diversity needs and make efficient use of land and services in Caboolture West, the Local plan code sets an average net residential density overall of 22 dwellings per hectare which combines the proposals for:

a) Next Generation 20: Net residential densities between 15-25 dwellings per hectare with a minimum average of 20 dwellings per hectare; and
b) Next Generation 30: Net residential density of a minimum average of 30 dwellings per hectare.

This is a different approach to that used in the rest of the planning scheme, however it is intended to result in the same outcome, dwelling diversity.

Calculating Residential Density:
Residential density can be measured in a number of different ways. All residential density measures are calculated using the same basic ratio formula: the number of dwellings divided by the area of land they occupy.

Residential density	=	**Number of lots/dwellings** **Land area**

These two residential density measures are referred to as “Net residential density” in the reconfiguring a lot code and “Site density” in zone codes. These residential densities are further described and defined below.

The extent of land included in the land area determines the type of density measure used.

Types of density measures and extent of land included:

a) **SITE** density: includes only the site area. Including internal access ways for community title developments and areas of land impacted by values or constraints (e.g. flooding, environmental areas and corridors etc.). It is the most concentrated measure of density.
b) **NET** density: includes the site area in addition to local roads and local parks.

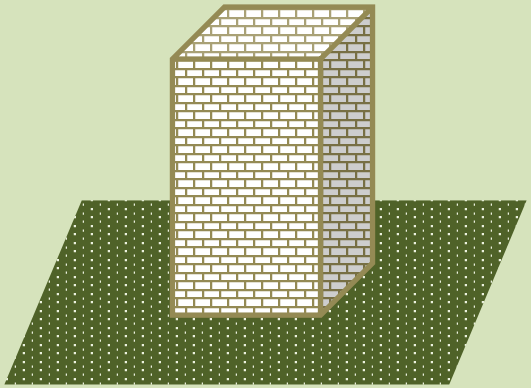
The planning scheme uses two residential density measures depending on the development (RAL or MCU) and the purpose of the outcome or the intent of the code.

The table below explains the equivalent densities between ‘Net residential’ and ‘site’ densities.

Net Residential Density (Dwellings per hectare d/ha)	**10d/ha**	**11d/ha**	**15d/ha**	**25d/ha**	**30d/ha**	**40dh/a**	**50d/ha**	**80d/ha**
Average lot area required for 1 dwelling (10,000/1.5/d/ha)	666m^2	606m^2	444m^2	266m^2	222m^2	166m^2	133m^2	83m^2
Average dwellings required on a 1000m^2 lot (0.1 X d/ha)	1.5 dwellings	1.65 dwellings	2.25 dwellings	3.75 dwellings	4.5 dwellings	6 dwellings	7.5 dwellings	12 dwellings
Site density (dwellings per hectare d/ha)	**15d/ha**	**16.5d/ha**	**22.5 d/ha**	**37.5d/ha**	**45d/ha**	**60d/ha**	**75d/ha**	**120d/ha**

Residential Density:

Site density = Measure of MCU density



Definition and purpose:

Site density includes only the site area and does not take into account the area of local roads and parks. It is the most concentrated measure of density.

The purpose of site density is to indicate the intensity of dwellings on a site or number of residential units allowed to be developed on a site. Site density has been used in the planning scheme to ensure the efficient use of land.

Calculation:

$$\textbf{Site Density} = \frac{\text{The total number of dwellings in a development}}{\text{The site area (ha), (the property on which the buildings(s) are constructed, not including roads, footpaths or parks)}}$$

OR

Number of dwellings = *Site density x site area (ha)*

Example: 10 dwellings, sited on a 0.5ha site (10 dwellings divided by the site area of 0.5ha), equals a site density of 20d/ha.

Net residential density (NRD) = Measure of RAL density

Land included in Developable land	Land excluded from Developable land
• All land for residential purposes • Land for mixed use containing residential uses • Land for local parks • Land for local roads	• Land for purposes other than residential • Parks servicing the broader region (district and higher order parks) • Sporting fields • Higher and middle order roads (National, state, arterial, sub-arterial or district collector) • Land deemed to be undevelopable due to constraints such as flooding, future roads requirements, steep land and significant vegetation.

Definition and purpose:

Net residential density includes residential components as well as local roads and local park as shown and listed in the column to the left.

This measure is useful when considering the density of larger developments, such as residential subdivision.

Calculation:

$$\textbf{Net Residential Density (NRD)} = \frac{\text{The total number of lots/dwellings}}{\text{Developable land (hectares)*}}$$

OR

Number of dwellings = *NRD x site area (ha)**

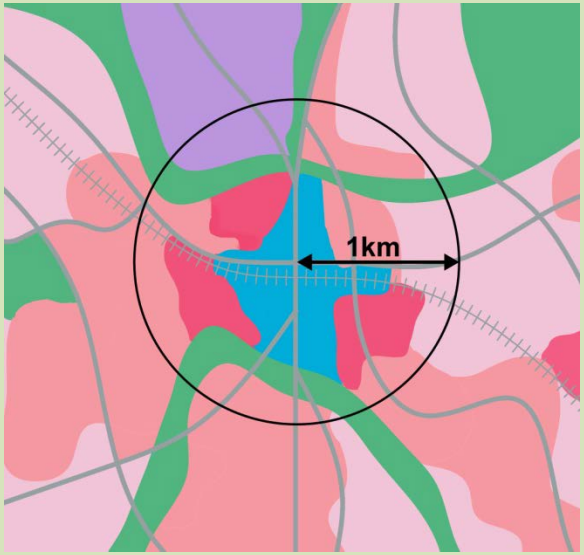
**Note: To calculate the net residential density of a small individual site, allowance must be given for the area of local roads and parks. Using a ratio of 2:1 (residential land: local roads and park), the area of a site must be increased by a factor of 0.5 to translate site density to net residential density.*
Example: A NRD of 15d/ha on a 0.5ha site (15d/ha x (0.5 x 1.5) equals 11 lots.

Note: The factor of 1.5 should not be used for sites with internal roads and public space such as community management schemes

Land use Intensity:

People and/or jobs per ha = Strategic framework intensity

***PEOPLE OR JOBS PER HA** is a holistic measure of intensity and includes residential uses, local roads plus local non-residential uses such as parks, shops and schools.*



Definition and purpose:

It is inclusive of a local neighbourhood and a wider range of urban land uses and activities than residential density. It includes residential and non-residential areas. Generally large areas of flood prone land, significant vegetation or undeveloped land are not included.

The purpose of People and/or jobs per ha is to determine or indicate whether there is sufficient activity in an area to make the area walkable and more serviceable by public transport. Land use intensity figures of 'people and/or jobs per ha' is a more appropriate measure of how an area meets or does not meet the vision and objectives of the Strategic framework rather than net or site density.

Calculation:

Activity intensity is measured over an area of urbanised land (residential, commercial, industrial, local parks, roads and other urban land uses) less any large undeveloped areas and non-urban land uses. It is not the same as net or site density. The measure of intensity or concentration of activities can be determined by selecting a focal point for activities (such as a local centre, a train station or an industrial area), measuring a 1 kilometre radius around a focal point and then extracting estimates of existing and forecast people and jobs for all the parcels of land within that selected area. Each of these calculated measures provide an indication of the level of activity intensity across the urban area.

The measure of intensity is indirectly related to residential net and site density as used in the planning scheme measures which are more a measure of building mass on any given site i.e. how many buildings or how much floor space is available on a site. Conversion factors such as occupancy rates, and floor space per employee are used to convert building mass to people and jobs and these conversion rates themselves can change over time with demographic change and changes in the economy. A 1 kilometre radius area covers 314 hectares, and may contain a few thousand urban land parcels. Each land parcel contributes to the measure of activity intensity but residential density and non-residential activity on each parcel can vary significantly depending on factors such as historic patterns of land use, the economics of development and market feasibility at any particular point in time, ownership or planning scheme measures.

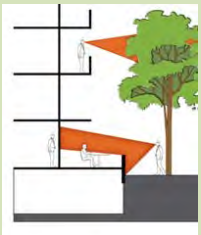
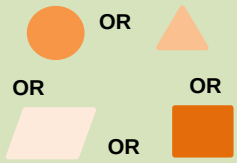
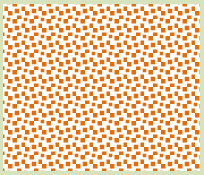
2.2 Dwelling diversity

Dwelling diversity provides a mix of dwellings that meet the different needs of a wide range of people in society. Of all the residential places in the Moreton Bay region the Next generation neighbourhood has the greatest dwelling diversity.

Dwelling diversity is important because it enables neighbourhoods to provide for changing demographics. It helps address housing affordability issues and it provides for different lifestyle choices and life stages including young families, single people and retirees. Having a wide range of dwellings makes it easier to meet the diverse housing needs of home owners, renters, investors, families, one or two person households and first home buyers. Diverse housing in local neighbourhoods helps build diverse and socially interesting places, avoiding housing 'mono-cultures'. They also cater to households on a range of income levels. In addition, a diversity of housing can contribute to the visual interest of the streetscape and neighbourhood, counteracting the uniformity of built form which can occur when all the dwellings are of a similar type.

1.2.1 Principles for successful housing diversity:

MBRC has 5 principles for delivering successful housing diversity in greenfield and established areas.

	***Affordability*** *Housing affordability needs to take into consideration all aspects relating to cost, not just the cost of construction. These costs include proximity to employment, schools, public transport and services and the use of materials, equipment and technology that reduce the running cost of a home. Individual dwelling design should consider issues such as orientation, building materials and insulation, to promote environmental sustainability.*
	***Amenity*** *The amenity of new dwelling occupants and neighbours is a significant issue that must be addressed when designing for housing diversity, particularly in established areas. Building designs that consider the streetscape, prevailing breezes and access to winter sun both on the site and neighbouring premises, will ensure the best possible amenity outcomes for occupants and their neighbours are achieved.*
	***Privacy*** *The privacy of occupants of new dwellings and of surrounding neighbours is regularly raised as a major concern where smaller allotments and units are proposed. Appropriately designed dwellings will ensure that privacy, both visual and acoustic, is maintained, whilst not impeding active streetscape outcomes and neighbourhood interaction.*
	***Wide choice*** *The housing market for smaller dwellings is not limited to one particular housing type or lot size. A wide range of housing products need to be delivered to ensure there is adequate choice for homebuyers at varying stages of life and in varying financial positions, and to ensure diversity within the overall streetscape.*
	***Salt and peppering*** *It is important that diverse housing forms are not clustered in only one location in a neighbourhood, but that they are dispersed in a variety of locations. There may still be localised 'clustering' of housing types, however, it should not be to an extent that clearly identifies an area as being different to otherwise similar areas. The key to successful housing diversity is to normalise it.*

3. Residential typologies

The Planning scheme defines three main residential uses - dwelling house, dual occupancy and multiple dwelling. Within each of these uses are a variety of housing types (i.e. traditional dual occupancy, loft or plex). We refer to these housing types as "residential typologies". Acknowledging that residential typologies are always changing and the distinction between attached and detached dwellings is becoming blurred, this section of the policy describes the residential typologies expected in the General residential zone. These typologies are utilised to demonstrate the variety of dwelling options available. Section 3.2 identifies which typologies are found in the three main residential places and section 3.3 describes and illustrates each typology.

3.1 Typologies defined:

The use of typologies emphasises the built form rather than the use, for example a Retirement facility (use) could be located in a high-rise apartment or a townhouse community. Residential typologies are used as a way of encouraging housing diversity and choices for places as desired by the Strategic framework.

The table below identifies examples of different residential typologies and what the defined use would be in the Planning scheme (refer to Schedule 1 Definitions in the planning scheme.

Typology	Use Definition		
	Dwelling House	Dual Occupancy	Multiple Dwelling
Secondary dwelling	✓	✗	✗
Dwelling house (Traditional Lot)	✓	✗	✗
Dwelling house (Narrow Lot)	✓	✗	✗
Dual Occupancy (Traditional)	✗	✓	✗
Dual Occupancy (Loft)	✗	✓	✗
Terrace or row housing	✓ Where individually titled	✗	✓ Where community titled
Plex: (3 to 5 units) Triplex Quadplex Quinplex	✗	✗	✓
Low Rise Apartment	✗	✗	✓
Medium Rise Apartment	✗	✗	✓
High Rise Apartment	✗	✗	✓
Townhouses (Managed Communities)	✗	✗	✓ Where community titled

Other residential use definitions include: Retirement facility, Residential care facility, Relocatable home park, Rooming accommodation, Short term accommodation, Tourist park.

3.2 Typology locations – Dwelling houses and Residential uses

The best location for each typology can vary depending on a number of factors including the place and its character, the street type and function, the width of the site and the sites location in relation to centres, neighbourhood hub's, parks and public transport. The below tables are a guide to demonstrate how these factors can be considered to determine the best location for each residential typology.

3.2.1 Suburban neighbourhood, Next generation neighbourhood and Urban neighbourhood precincts

Legend:

Street: Road Hierarchy	Typology:	
Laneway	⓿Dwelling House (Traditional)	❻Multiple Dwelling (Plexes)
Access Streets AND Local Collector	❶Dwelling House (Narrow)	❼Multiple Dwelling (Terrace or row house)
District Collector	❷Dwelling House (Terrace, row house or plex)	❽Multiple Dwelling (Low Rise Apartment)
Sub-Arterial* / Arterial	❸Dwelling Unit	❾Multiple Dwelling (Medium Rise Apartment)
	❹Dual Occupancy (Traditional)	❿Multiple Dwelling (High Rise Apartment)
	❺Dual Occupancy (Loft)	M Multiple Dwellings (Townhouses)

**vehicle access must not be via Sub-arterial or Arterial roads.*
❾[1] – Must be within 400m walking distance of a neighbourhood hub or within 800m walking distance of a higher order or district centre.
❷[2]❻[2]❼[2]– Must be adjoining or opposite public open space.

Primary Frontage Width	Suburban Neighbourhood Precinct	Next Generation Neighbourhood Precinct	Urban Neighbourhood Precinct
>35m	⓿❹❼[1,2]	⓿❹❼	⓿❸❼❽
	⓿❹❻[2]❼[2]	⓿❹❻❼	⓿❸❼❽❾❿
	⓿❹❻[2]❼[2]❽[1]M[1]	⓿❸❻❼❽❾[1]M	⓿❸❻❼❽❾❿M
	⓿❹❻[2]❼[2]❽[1]M[1]	⓿❸❻❼❽❾[1]M	❻❼❽❾❿M
>30m	⓿❹❼[2]	⓿❹❼	⓿❸❼❽
	⓿❹❻[2]❼[2]	⓿❹❻❼	⓿❸❼❽❾❿
	⓿❹❻[2]❼[2]❽[1]M[1]	⓿❸❹❻❼❽❾[1]M	⓿❸❻❼❽❾❿M
	⓿❹❻[2]❼[2]❽[1]M[1]	⓿❸❹❻❼❽❾[1]M	❻❼❽❾❿M
>25m	⓿❹❻[2]	⓿❹❼	⓿❸
	⓿❹❼[2]	⓿❹❻❼	⓿❸❻❼❽❾
	⓿❹❻[2]❼[2]❽[1]M[1]	⓿❸❹❻❼❽❾[1]M	⓿❸❻❼❽❾M
	⓿❹❻[2]❼[2]❽[1]M[1]	⓿❸❹❻❼❽❾[1]M	❻❼❽❾M
>20m	⓿❺	⓿❺	⓿❻❼❽
	⓿❺	⓿❺	⓿❻❼❽
	⓿❺	⓿❸❺	⓿❸❻❼❽
	⓿❺	⓿❸❺	⓿❸❻❼❽
>18m	⓿❺	⓿❺	⓿
	⓿❺	⓿❺	⓿❽
	⓿❺	⓿❸❺	⓿❸❽
	⓿❺	⓿❸❺	⓿❸❼❽
>12.5	❶❷[2]❺	❶❷❺	❶❷
	❶❷[2]❺	❶❷❺	❶❷
	❶❷[2]❺	❶❷❺	❶❷❸
	❶❷[2]❺	❶❷❺	❶❷
>10m	❶❷[2]❺	❶❷❺	❶❷
	❶❷[2]❺	❶❷❺	❶❷
	❶❷[2]❺	❶❷❺	❶❷❸
	❶❷[2]❺	❶❷❺	❶❷
>7.5m	❶❷[2]❺	❶❷❺	❶❷❺
	❶❷[2]❺	❶❷❺	❶❷❺
	❶❷[2]❺	❶❷❺	❶❷❸❺
	❶❷[2]❺	❶❷❺	❶❷❺

3.2.2 Caboolture West Local Area Plan

Legend:

Street: Road Hierarchy	Typology:	
Neighbourhood street	⓿Dwelling House (Traditional)	❻Multiple Dwelling (Plexes)
Main street	❶Dwelling House (Narrow)	❼Multiple Dwelling (Terrace or row house)
Neighbourhood connector street	❷Dwelling House (Terrace, row house or plex)	❽Multiple Dwelling (Low Rise Apartment)
	❸Dwelling Unit	❾Multiple Dwelling (Medium Rise Apartment)
	❹Dual Occupancy (Traditional)	❿Multiple Dwelling (High Rise Apartment)
	❺Dual Occupancy (Loft)	**M** Multiple Dwellings (Townhouses)

Primary Frontage Width	Next generation neighbourhood	Next generation neighbourhood - Within 400m walking distance of a Local centre
>35m	⓿❹❻❼	⓿❸❺❼❽
	⓿❸❻❼M	❸❻❼❽❾❿M
	⓿❸❻❼M	❻❼❽❾❿M
>30m	⓿❹❻❼	⓿❸❺❼❽
	⓿❸❹❻❼M	❸❻❼❽❾❿M
	⓿❸❹❻❼M	❻❼❽❾❿M
>25m	⓿❹❻❼	⓿❸❺
	⓿❸❹❻❼M	❸❻❼❽❾M
	⓿❸❹❻❼M	❻❼❽❾M
>20m	⓿❺	⓿❺
	⓿❸❺	❸
	⓿❸❺	⓿❸❺
>18m	⓿❺	⓿❺
	⓿❸❺	❸❺
	⓿❸❺	⓿❸❺❼
>12.5	❶❷❺	❶❷❺
	❶❷❺	❷❸❺
	❶❷❺	❶❷❺
>10m	❶❷❺	❶❷❺
	❶❷❺	❷❸❺
	❶❷❺	❶❷❺
>7.5m	❶❷❺	❷❺
	❶❷❺	❷❸❺
	❶❷❺	❶❷❺

3.2.3 Emerging community zone

Legend:

Street: Road Hierarchy	Typology:	
Laneway	⓿Dwelling House (Traditional)	❻Multiple Dwelling (Plexes)
Access Streets AND Local Collector	❶Dwelling House (Narrow)	❼Multiple Dwelling (Terrace or row house)
District Collector	❷Dwelling House (Terrace, row house or plex)	❽Multiple Dwelling (Low Rise Apartment)
Sub-Arterial* / Arterial	❸Dwelling Unit	❾Multiple Dwelling (Medium Rise Apartment)
	❹Dual Occupancy (Traditional)	❿Multiple Dwelling (High Rise Apartment)
	❺Dual Occupancy (Loft)	**M** Multiple Dwellings (Townhouses)

**vehicle access must not be via Sub-arterial or Arterial roads.*
❾[1] – Must be within 400m walking distance of a Neighbourhood Hub or within 800m walking distance of a Higher order or District centre.

Primary Frontage Width	Transition precinct – All other areas	Transition precinct – Morayfield South urban area
>35m	⓿❹❼	⓿❸❼❽
	⓿❹❻❼	⓿❸❼❽❾❿
	⓿❸❻❼❽❾[1]M	⓿❸❻❼❽❾❿M
	⓿❸❻❼❽❾[1]M	❻❼❽❾❿M
>30m	⓿❹❼	⓿❸❼❽
	⓿❹❻❼	⓿❸❼❽❾❿
	⓿❸❹❻❼❽❾[1]M	⓿❸❻❼❽❾❿M
	⓿❸❹❻❼❽❾[1]M	❻❼❽❾❿M
>25m	⓿❹❼	⓿❸
	⓿❹❻❼	⓿❸❻❼❽❾
	⓿❸❹❻❼❽❾[1]M	⓿❸❻❼❽❾M
	⓿❸❹❻❼❽❾[1]M	❻❼❽❾M
>20m	⓿❺	⓿❻❼❽
	⓿❺	⓿❻❼❽
	⓿❸❺	⓿❸❻❼❽
	⓿❸❺	⓿❸❻❼❽
>18m	⓿❺	⓿
	⓿❺	⓿
	⓿❸❺	⓿❸
	⓿❸❺	⓿❸❼
>12.5	❶❷❺	❶❷
	❶❷❺	❶❷
	❶❷❺	❶❷❸
	❶❷❺	❶❷
>10m	❶❷❺	❶❷
	❶❷❺	❶❷
	❶❷❺	❶❷❸
	❶❷❺	❶❷
>7.5m	❶❷❺	❶❷❺
	❶❷❺	❶❷❺
	❶❷❺	❶❷❸❺
	❶❷❺	❶❷❺

3.3 Typologies described and illustrated

With a wide range of different densities provided for by the MBRC Planning Scheme and the different possibilities offered by architectural design and modern building construction, it can be difficult to visualise how these different residential typologies would look on the ground. The following is a series of illustrations and examples describing each residential typology.

3.3.1 Dwelling house – Traditional lot ⓿

Typical Form

	Detached
Typical Height:	1-2 storeys
Typical Site Cover:	50% (excluding eves, sun shading devices, patios, balconies and other unenclosed structures)
Open Space:	Backyard
Car parking Configuration:	Double garage, tandem visitor space
Street Road Hierarchy:	Access Street / Local Collector


(Kawana)


(Narangba)


(Kawana)

Description

A single or two-storey dwelling that stands on a single lot and includes private open space. It is not attached to any other dwelling, but may be built to a side boundary.

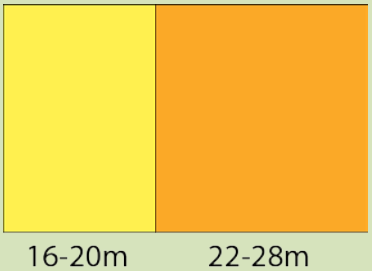
A Dwelling house may also contain a secondary dwelling. Secondary dwellings are designed and sited to appear as one with the primary dwelling house from the street and may be attached or detached from the primary dwelling. The secondary dwelling is subordinate to the primary dwelling and shares some facilities such as driveways, car parking and open space. This form of housing cannot be titled separate from the primary dwelling.


(Morayfield)


(Narangba)


(Narangba)

Dwelling house on traditional lot floor plan with a secondary dwelling.



Typical lot types C or D

3.3.2 Dwelling house – Narrow lot ❶

Typical Form

	Detached
Typical Height:	1-2 storeys
Typical Site Cover:	50% (excluding eves, sun shading devices, patios, balconies and other unenclosed structures)
Open Space:	Backyard
Car parking Configuration:	Garage, tandem or double where access via laneway visitor space
Street Road Hierarchy:	Laneway(Rear) / Access Street / Local Collector

(Kawana)

(Maroochydore)
Example of a narrow lot with rear lane access

(Maroochydore)

Description

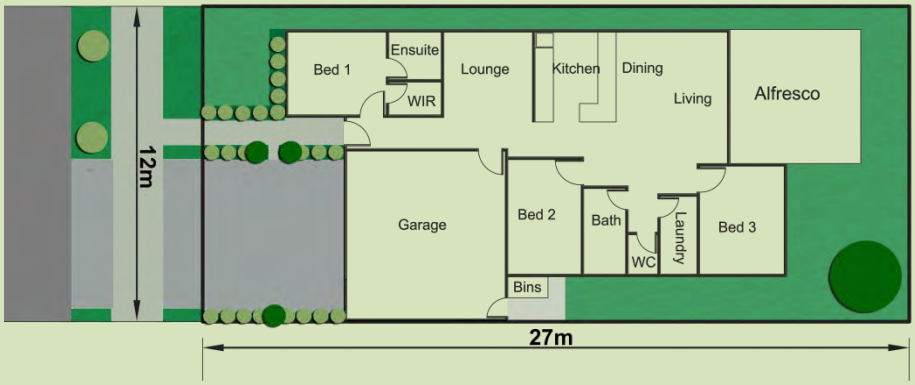
A single or two-storey dwelling that stands within its own grounds and includes private open space. It is not attached to any other dwelling, but may be built to one or both side boundaries.

A Dwelling house may also contain a secondary dwelling. Secondary dwellings are designed and sited to appear as one with the primary dwelling house from the street and may be attached or detached from the primary dwelling. The secondary dwelling is subordinate to the primary dwelling and shares some facilities such as driveways, car parking and open space. This form of housing cannot be titled separate from the primary dwelling.

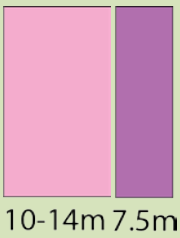
(North Lakes)

(North Lakes)

(Warner)



Dwelling house on a narrow lot floor plan.



Typical lot types B or A

3.3.3 Dwelling house or Multiple dwelling – Terrace, row house or plex ❷❼

Typical Form

	Attached but established individually or as a group
Typical Height:	1-3 storeys
Typical Site Cover:	50%-75%(depending on lot size and building height)
Open Space:	Backyard
Car parking Configuration:	Single or tandem garage, tandem or double where access via laneway or where 2 storey
Street Road Hierarchy:	Laneway(Rear) and Access Street / Local Collector

(Maroochydore)
Front of dwellings with no rear laneway access

(Fitzgibbon)

(Maroochydore)

Description

Dwellings attached to other dwellings horizontally by one (for dwellings at the end of a row of terraces) or two common built to boundary walls. A terrace or row house may be a single, two or three storey dwelling with a ground level, own entry from the street or park and private open space. It is generally characterised by a consistent alignment along the street or park with adjoining dwellings. Terrace or row houses may share a driveway between two dwellings but do not generally share other facilities.

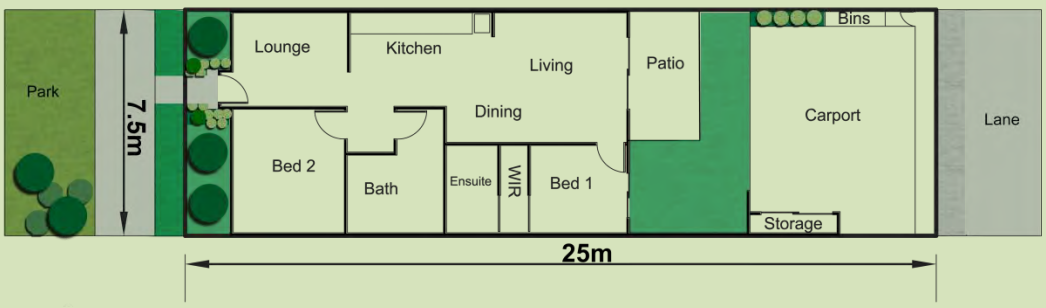
The best streetscape outcome is achieved when a terrace house has rear lane access for car parking so the street frontage is free of driveways and vehicle movements do not interfere with safe and efficient function of the street.

Tenure may vary for terrace or row housing; they may be established as free hold title with narrow lots built to boundary both sides or on a larger lot as a Multiple dwelling. Depending on the tenure, easements may be required to ensure the efficient construction and ongoing maintenance of this housing typology.

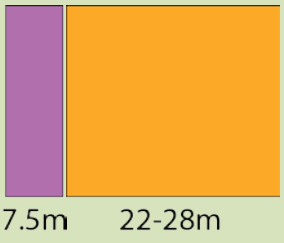
(Maroochydore))
Front, adjoining park

(Maroochydore)
Front of dwellings with rear laneway access

(Maroochydore)
Rear, adjoining laneway



Terrace or row house floor plan.



Typical lot types A, D or E

3.3.4 Dual occupancy – Traditional ❹

Typical Form

	Attached or Detached
Typical Height:	1-2 storeys
Typical Site Cover:	50% - 60% (depends on lot size and building height)
Open Space:	Backyard / Courtyard
Car parking Configuration:	Garage, carport
Street Road Hierarchy:	Laneway(Rear) / Access Street / Local Collector


(Fitzgibbon)


(Fitzgibbon)

Description

Traditionally a single or two storey dwelling that is usually attached horizontally to one other dwelling by a common wall but may also be detached. The dwellings may share a driveway but generally all other facilities are separate. Generally, the dwellings are equal in size and do not include a primary and subordinate dwelling. This form of housing may be titled separately after construction.


(Caboolture)


(Caboolture)


(Varsity Lakes)
Dual occupancy on a corner

Traditional Dual occupancy on a corner lot floor plan.

Typical lot type D or E

3.3.5 Dual occupancy – Loft (incorporating a primary dwelling and a loft dwelling) ❺

Typical Form

	Attached or detached
Typical Height:	1-2 storeys
Typical Site Cover:	50%-75% (depends on lot size and building height)
Open Space:	Backyard / Courtyard / Balcony
Car parking Configuration:	Single garage per dwelling, accessed via laneway
Street Road Hierarchy:	Laneway(Rear) / Access Street / Local Collector / District Collector / Sub-Arterial

(Fitzgibbon)

(Fitzgibbon)

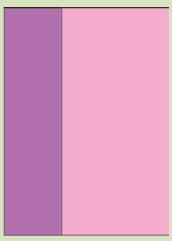
Description

Dual occupancies can take on other forms commonly referred to as a loft or fonzy flat. These Dual occupancies consist of a single or two storey dwelling, being the primary dwelling, with one other smaller dwelling attached (horizontally or vertically). The dwellings may share a driveway but generally all other facilities are separate. In most cases, each dwelling faces a separate frontage, and are therefore typically serviced by a rear lane. This form of housing provides for a loft built above garages that provide a lockable car parking space for the primary dwelling, a lockable car parking space for the loft and a front door for the loft all accessed via the lane. This form of housing may be titled separately from the primary dwelling house after construction (via a building format plan) but requires specific design responses to ensure compliance with different building classifications.

Lofts require care in their location to ensure sufficient on-street visitor parking is available close by.

(Fitzgibbon)

Dual occupancy (with a loft) floor plan.



7.5m10-14m

Typical lot types A or B

3.3.6 Multiple dwelling – Plexes (triplex 3 units, quadplex 4 units, quinplex 5 units) ❻

Typical Form

	Attached or Detached
Du/Lot:	3/4/5 units
Typical Height:	1-3 storeys
Title:	Community
Typical Site Cover:	50%-75%
Open Space:	Courtyard
Car parking Configuration:	Garage / carport / semi-basement / sleeved ground level parking
Street Road Hierarchy:	Access Street / Local Collector

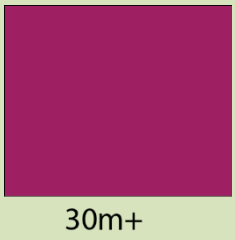
(North Lakes)

Plex floor plan.

Description

Small multiple dwelling buildings that are attached horizontally not vertically. Their design is highly variable and relates to site size and shape. Plex includes triplex (3 dwellings), quadplex (4 dwellings), and quinplex (5 dwellings), under standard or building format plan. Plexes typically have individual entries and driveways and have ground floor private open space.

This form of housing is ideally located on corner lots to reduce the negative impacts of multiple garage doors and driveways on the streetscape and on-street car parking.



Typical lot type E

(Fitzgibbon)

3.3.7 Multiple dwelling – Low rise apartment ❽

Typical Form

	Attached
Typical Height:	2-3 storeys
Typical Site Cover:	50% - 75% (depending on lot size and building height)
Open Space:	Balconies
Car parking Configuration:	Semi-basement / sleeved ground level / basements
Street Road Hierarchy:	Access Street / Local Collector / District Collector

Note: Uses in this form may include; Retirement facility, Residential care facility, Rooming accommodation, Short term accommodation.

(??)

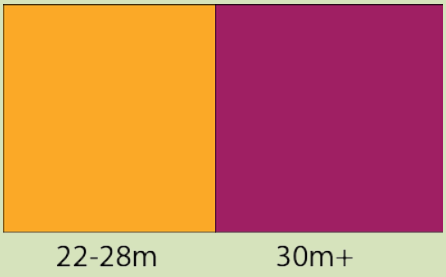
(Maroochydore)

Description

Low rise apartments are up to three storeys in height and contain a group of dwellings which are attached vertically by a common floor/ceiling and are titled by way of a building format plan (units are located above or below each other). Access to each unit is usually through common property. Units are typically located above ground level or semi-basement car parking. Dwellings have their own private open space, typically in the form of a balcony or courtyard, but share facilities such as car parking and driveways and may contain communal open space. In the case of mixed use buildings, units are located above commercial or retail uses.

(Ascot)

(Ascot)



Typical lot type D or E

3.3.8 Multiple dwelling – Medium rise apartment ❾

Typical Form

	Attached
Typical Height:	4 – 6 storeys
Typical Site Cover:	40% - 75% (depending on lot size and building height)
Open Space:	Balconies
Car parking Configuration:	Semi-basement / sleeved ground level / basements
Street Road Hierarchy:	Access Street / Local Collector / District Collector / Sub-Arterial Road

Note: Uses in this form may include; Retirement facility, Residential care facility, Rooming accommodation, Short term accommodation.

(Kawana)

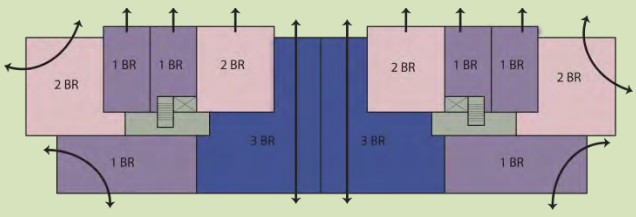

(Cotton Tree)


(Ascot)

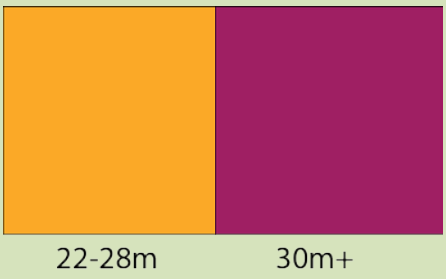
Description

Medium rise apartments are between four and six storeys in height and contain a group of dwellings that are attached by a common floor/ceiling/wall and are titled by way of a building format plan (units are located above or below each other). Dwellings have their own private open space, usually in the form of a balcony, but share facilities such as car parking and driveways and may have communal open space. Access to each unit is usually through common property. Units are typically located above basement or semi-basement car parking or in the case of mixed use buildings units are located above commercial or retail uses.


(Kawana)



- Developments of ten or more dwellings should include a range of dwelling sizes, including studio, 1, 2 and 3+ bedroom dwellings.
- Dwelling diversification should be provided to:
  - provide a range of dwelling sizes in developments of ten or more dwellings;
  - provide different housing choice and support different lifestyles;
  - create a diversity of occupants in a building which will contribute to more successful community;
  - provide more opportunity to create better layout by arranging different sizes of apartments on one floor;
  - create opportunity for a better apartment layout.



Typical lot type D or E

3.3.9 Multiple dwelling – High rise apartment ⑩

Typical Form

	Attached
Typical Height:	7 or more storeys
Typical Site Cover:	40%
Open Space:	Balconies
Car parking Configuration:	semi-basement / basements
Street Road Hierarchy:	Access Street / Local Collector / District Collector / Sub-Arterial Road

Note: Uses in this form may also include: Retirement Facility, Residential Care Facility, Rooming Accommodation, Short Term Accommodation.

(Redcliffe)

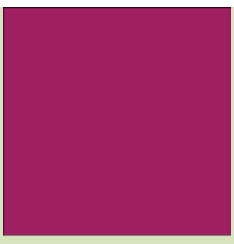
(Maroochydore)


(Kelvin Grove)


(Maroochydore)

Description

High rise apartments are seven storeys in height or greater and contain a group of dwellings which are attached vertically by a common floor/ceiling/wall and titled by way of a building format plan (units are located above or below each other). Dwellings have their own private open space in the form of a balcony, but share facilities such as car parking, driveways and communal open space. Access to each unit is usually through common property. Units are typically located above basement car parking or in the case of mixed use buildings units are located above commercial or retail uses.



Typical lot type E

3.3.10 Multiple dwelling – Townhouses and managed communities M

Typical Form

	Attached or Detached
Typical Height:	1 – 3 storeys
Typical Site Cover:	50% - 75% (depending on lot size and building height)
Open Space:	Courtyard / balconies
Car parking Configuration:	Garage accessed via internal driveway
Street Road Hierarchy:	Laneway(Rear) / Access Street / Local Collector

Note: Uses in this form may also include: Retirement Facility, Residential Care Facility, Relocatable Home Park, Rooming Accommodation, Short Term Accommodation, Tourist Park.

(North Lakes)

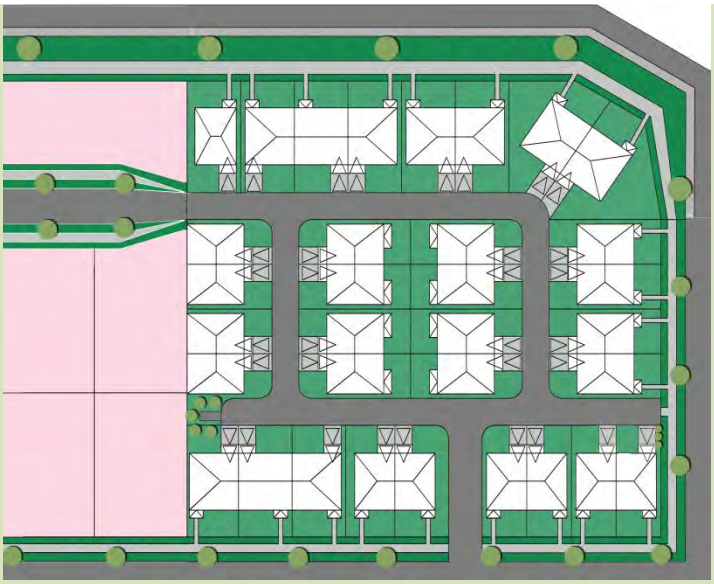
(Brightwater)
Opposite public open space

(North Lakes)

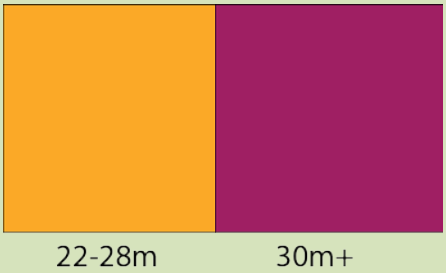
Description

These forms of development include 6 or more (5 or less would be a Plex) dwellings, either attached or detached, and usually have a number of shared facilities from open space and recreational facilities to utilities such as driveways and waste facilities. Dwellings are generally titled by way of a building or standard format plan or other forms of legislative management schemes.

(North Lakes)



Townhouse layout plan



Typical lot type D or E

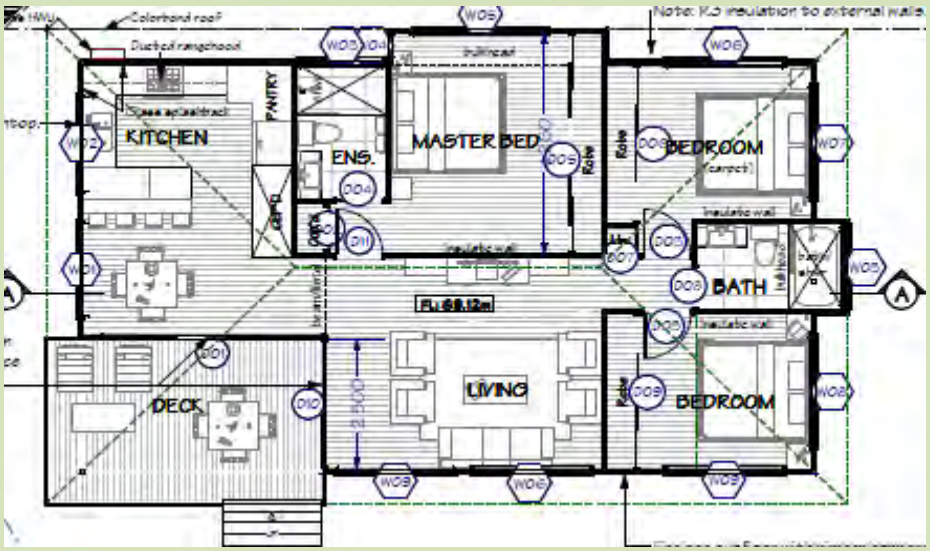
4. Dwelling Houses

4.1 When is a house extension a secondary dwelling and when is it an extension to the Dwelling house?

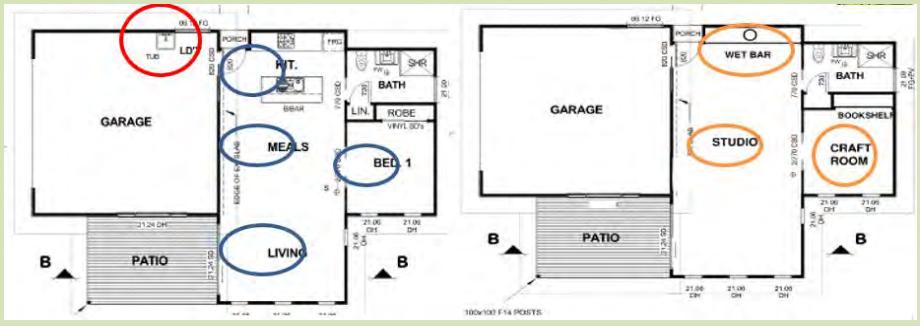
Any extension to a house (detached or otherwise) is considered to be a secondary dwelling where it is being used or would be capable of being used as a self-contained residence. While the definition of a Dwelling (refer below) lists the type of facilities that must be provided in order for it to be a dwelling, clothes washing facilities for example is not just a designated laundry. If a laundry isn't indicated on the plans this does not mean the extension is not capable of providing clothes washing facilities.

Unlike the definition of a dwelling within building legislation (a class 1 building) the planning scheme definitions for what constitutes a single dwelling are more general in terms of the facilities that must be provided.

If you would like clarification in relation to a specific extension to a Dwelling house it is recommended that written advice be obtained from Council (fee for written advice may apply).



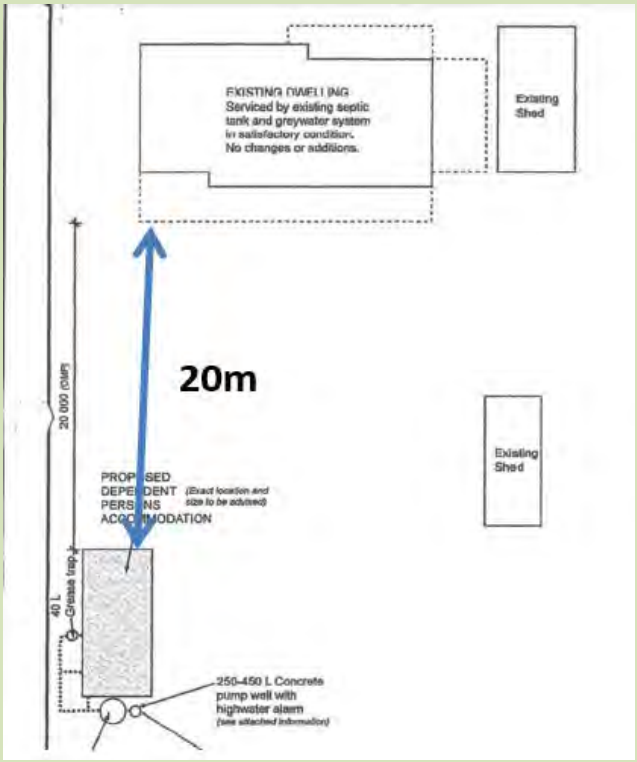
✘Not a house extension this is a secondary dwelling
Just because there is no laundry does not make this a detached house extension.



✘Not a house extension this is a secondary dwelling
What the rooms are labelled makes no difference. If it is capable of being use as a self-contained residence then it is a secondary dwelling.

4.2 Measuring separation distances

The requirement to locate a Secondary dwelling within 10m or 50m of the primary dwelling is measured from the outermost projection of the primary dwelling (being the main house, excluding domestic outbuildings) to the outermost projection of the Secondary dwelling. The entire Secondary dwelling does not need to be contained within the specified distance.



4.3 Additional garages to appear as one dwelling from the street

✓

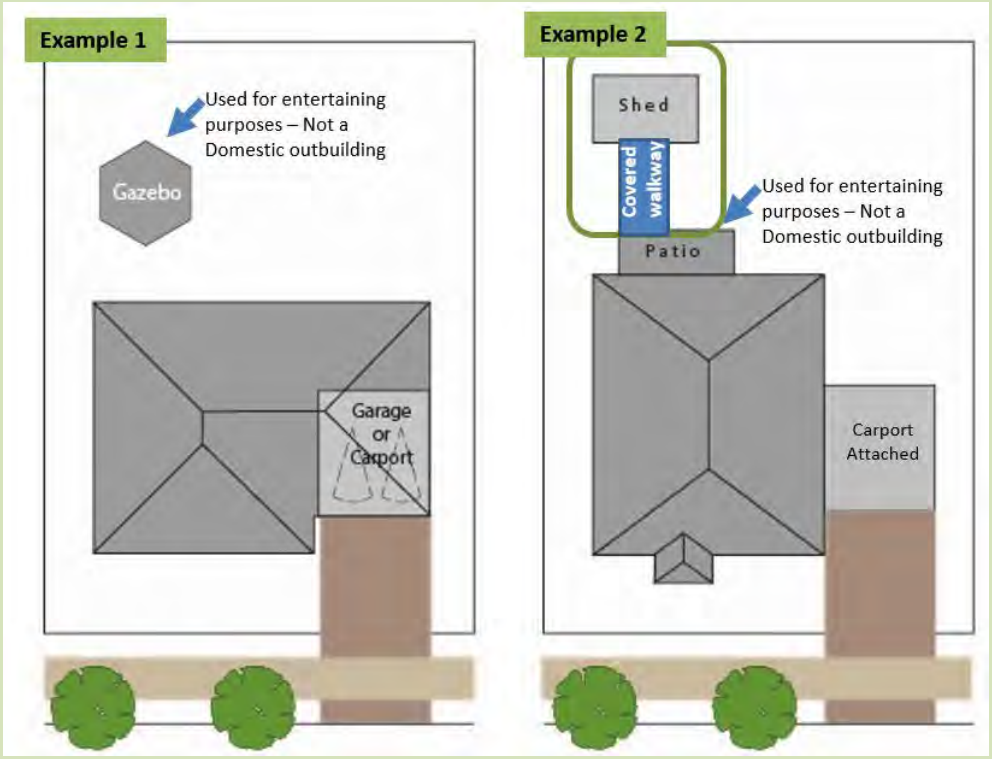
✘

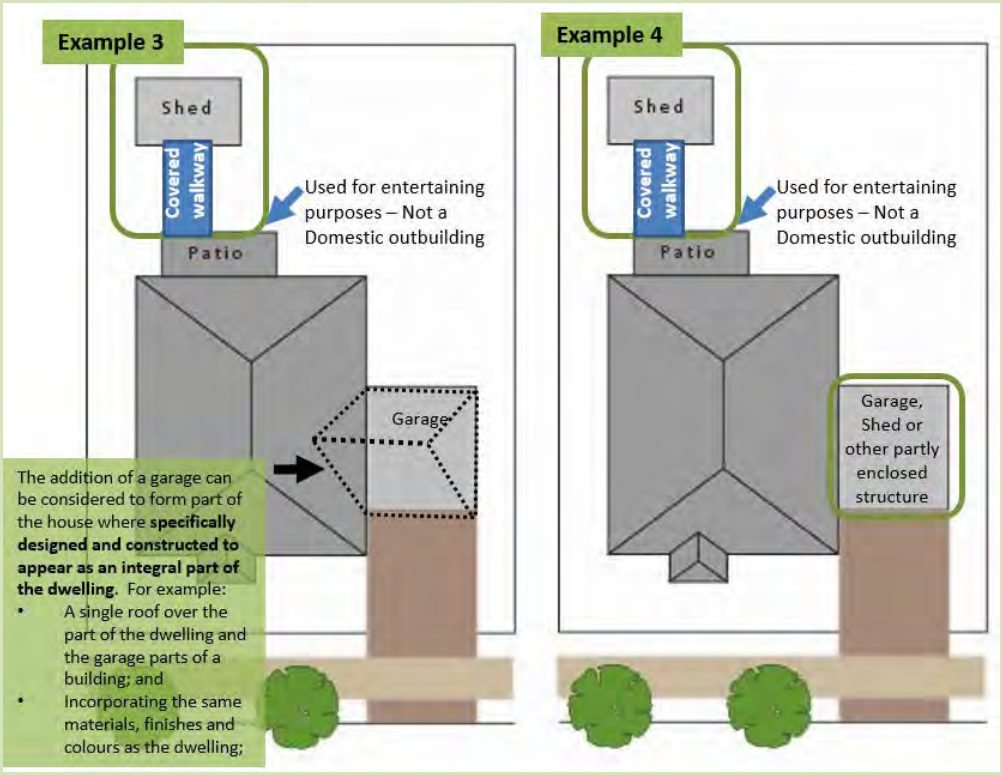
✓

✘

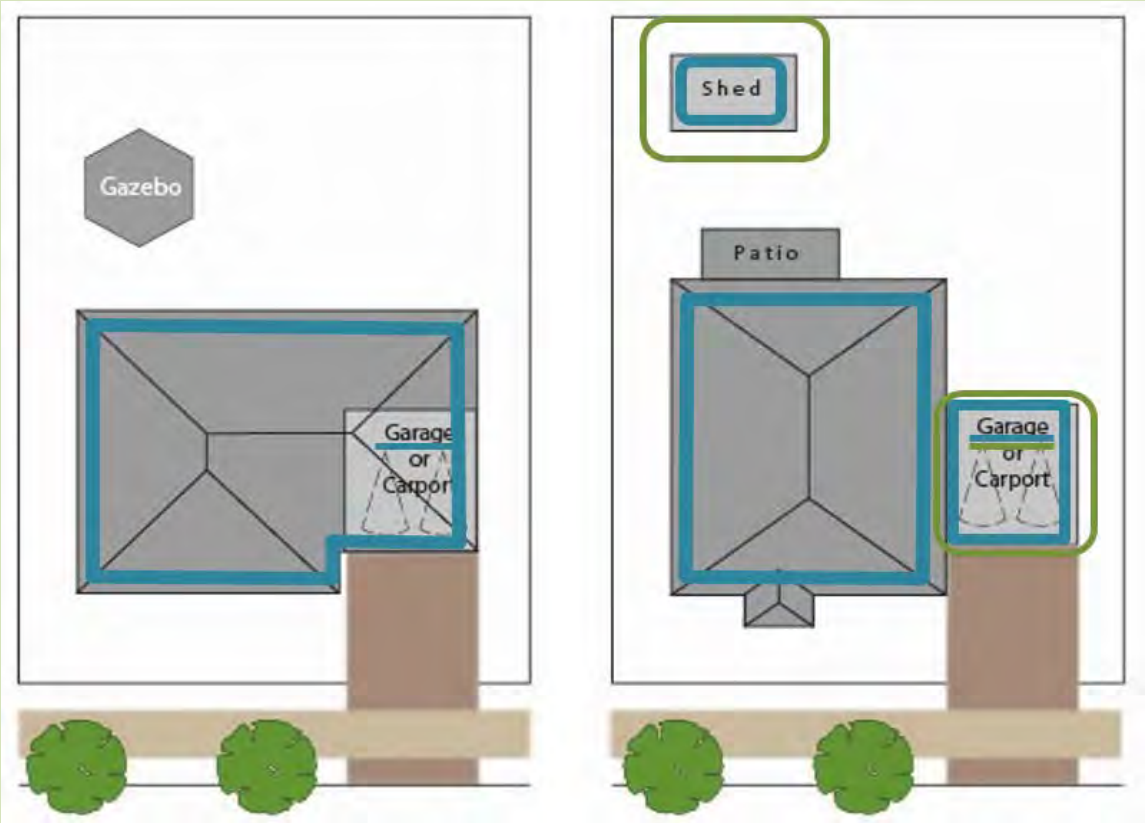
4.4 Domestic outbuildings

What is a domestic outbuilding? What is 'total maximum roofed area' applicable to?

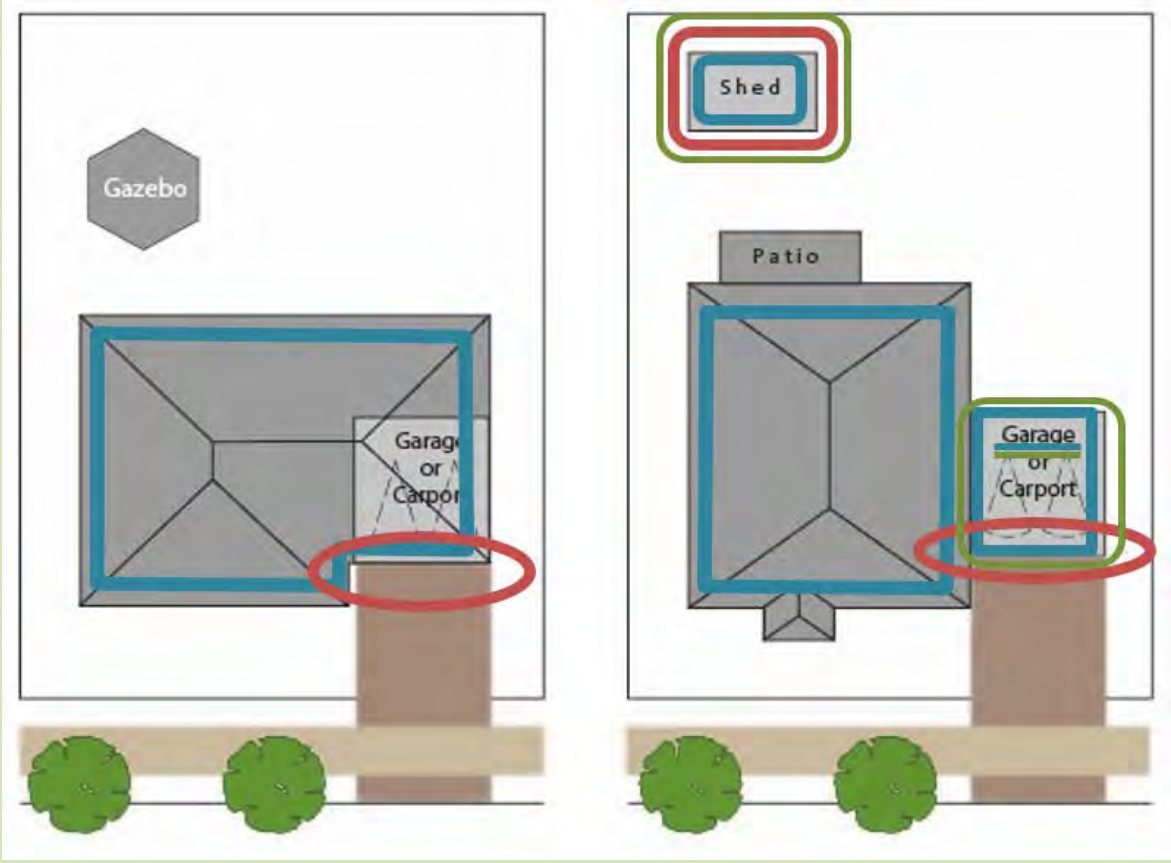




What is site cover applicable to?



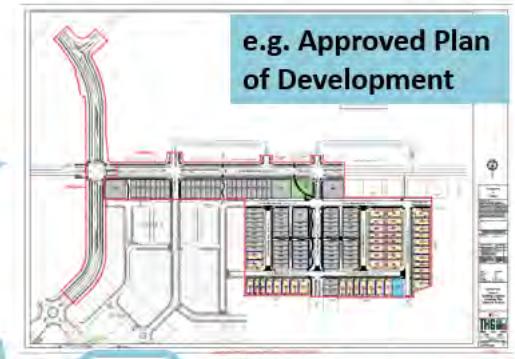
What does the min 5.4m setback to "covered car parking space and domestic outbuilding' apply to?

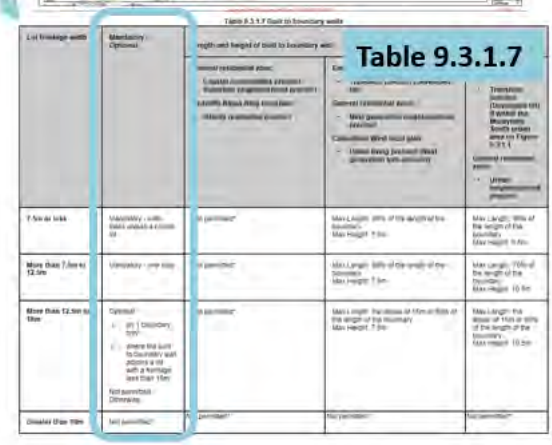


4.5 Built to boundary walls

Built to boundary wall location & Mandatory/Optional

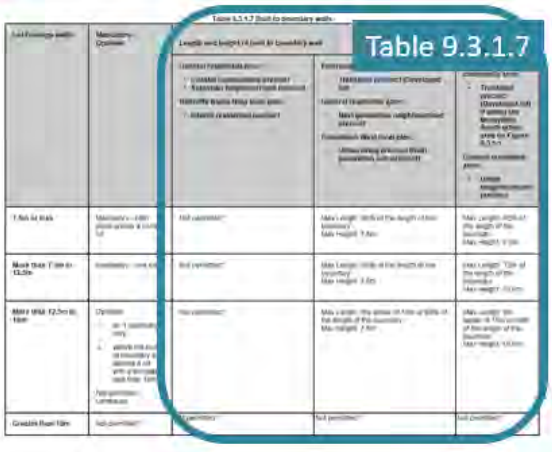
SAO4	Built to boundary walls: a. if required by an existing approval issued by council, establish in accordance with the plan of development under that existing approval (including any subsequent amendments to that plan of development that are approved by council in writing); OR if no approved plan of development applies to the land, only establish on lots having a primary frontage of 18m or less and where permitted in Table 9.3.1.7 b. of a length and height not exceeding that specified in Table 9.3.1.7; c. setback from the side boundary: i. if a plan of development provides for only one built to boundary wall on the one boundary, not more than 200mm; or ii. if a built to boundary wall may be built on each side of the same boundary, not more than 20mm; d. on the low side of a sloping lot. Editor's note - Lots containing built to boundary walls should also include an appropriate easement to facilitate the maintenance of any wall within 600mm of a boundary. For boundaries with built to boundary walls on adjacent lots a 'High Density Development Easement' is recommended; or for all other built to boundary walls a 'easement for maintenance purposes' is recommended. Note - The above setbacks apply only to Class 1a and Class 10a buildings/structures. Note - This is a quantifiable standard that is an alternative provision to the QDC, part MP1.1, A1 (a), (b) and (c), A2 (a), (b) and (d) and part MP1.2, A1 (a), (b) and (c), A2 (a), (b) and (d). Non-compliance with this provision for a Dwelling house(22) requires a concurrence agency response from Council. Editor's note - A wall is not to be built to the boundary if it has a window or if a wall of a building on an adjoining lot: a.is within 900mm of that boundary; b.is not constructed from masonry or other material fire rated in accordance with the Building Code of Australia; c.is no closer than 1.5m to a window or opening to a habitable room of an adjoining dwelling.



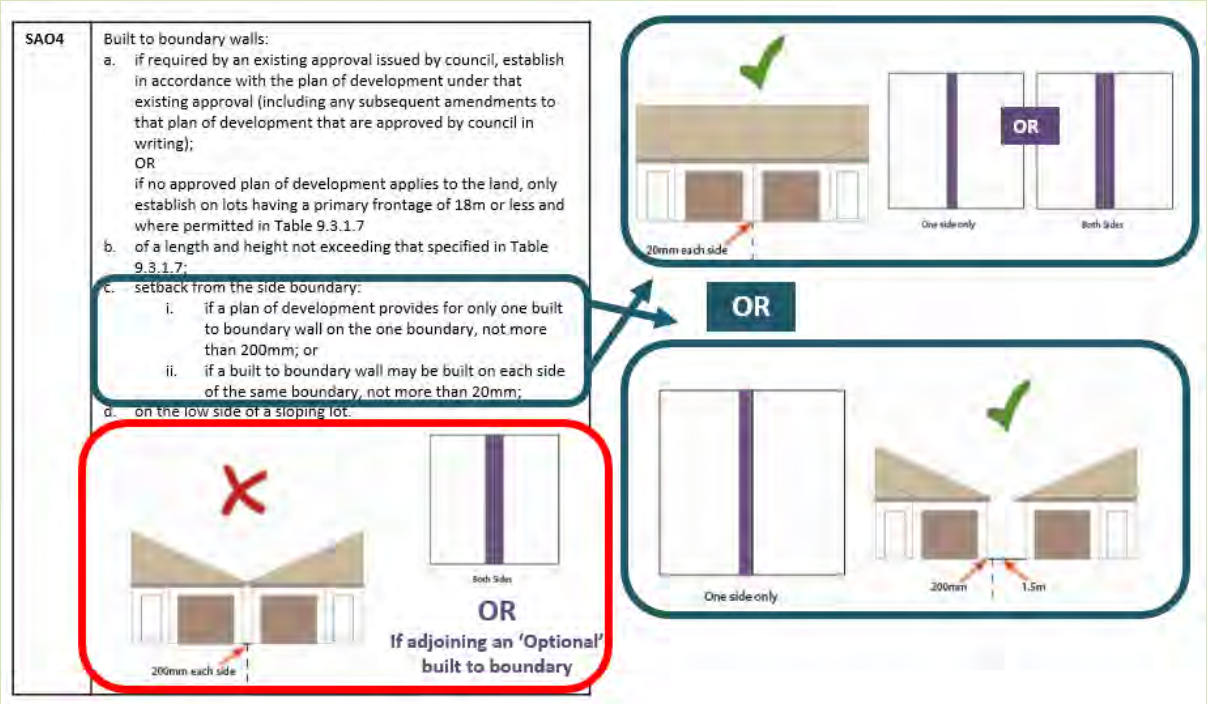


Built to boundary wall - Length & height

SAO4	Built to boundary walls: a. if required by an existing approval issued by council, establish in accordance with the plan of development under that existing approval (including any subsequent amendments to that plan of development that are approved by council in writing); OR if no approved plan of development applies to the land, only establish on lots having a primary frontage of 18m or less and where permitted in Table 9.3.1.7 b. of a length and height not exceeding that specified in Table 9.3.1.7; c. setback from the side boundary: i. if a plan of development provides for only one built to boundary wall on the one boundary, not more than 200mm; or ii. if a built to boundary wall may be built on each side of the same boundary, not more than 20mm; d. on the low side of a sloping lot. Editor's note - Lots containing built to boundary walls should also include an appropriate easement to facilitate the maintenance of any wall within 600mm of a boundary. For boundaries with built to boundary walls on adjacent lots a 'High Density Development Easement' is recommended; or for all other built to boundary walls a 'easement for maintenance purposes' is recommended. Note - The above setbacks apply only to Class 1a and Class 10a buildings/structures. Note - This is a quantifiable standard that is an alternative provision to the QDC, part MP1.1, A1 (a), (b) and (c), A2 (a), (b) and (d) and part MP1.2, A1 (a), (b) and (c), A2 (a), (b) and (d). Non-compliance with this provision for a Dwelling house(22) requires a concurrence agency response from Council. Editor's note - A wall is not to be built to the boundary if it has a window or if a wall of a building on an adjoining lot: a.is within 900mm of that boundary; b.is not constructed from masonry or other material fire rated in accordance with the Building Code of Australia; c.is no closer than 1.5m to a window or opening to a habitable room of an adjoining dwelling.



Built to boundary wall - Setbacks


SAO4
Built to boundary walls:
a. if required by an existing approval issued by council, establish in accordance with the plan of development under that existing approval (including any subsequent amendments to that plan of development that are approved by council in writing);
OR
if no approved plan of development applies to the land, only establish on lots having a primary frontage of 18m or less and where permitted in Table 9.3.1.7
b. of a length and height not exceeding that specified in Table 9.3.1.7;
c. setback from the side boundary:
i. if a plan of development provides for only one built to boundary wall on the one boundary, not more than 200mm; or
ii. if a built to boundary wall may be built on each side of the same boundary, not more than 20mm;
d. on the low side of a sloping lot.
OR
20mm each side
One side only
Both Sides
OR
200mm each side
Both Sides
OR
If adjoining an 'Optional' built to boundary
One side only
200mm
1.5m

5. Building form and design

The design of buildings should be appropriate to the place in which they preside. Built form provisions relating to height, setbacks and site cover are utilised to achieve particular design outcomes that enhance local character.

(North Lakes)

5.1 Character context

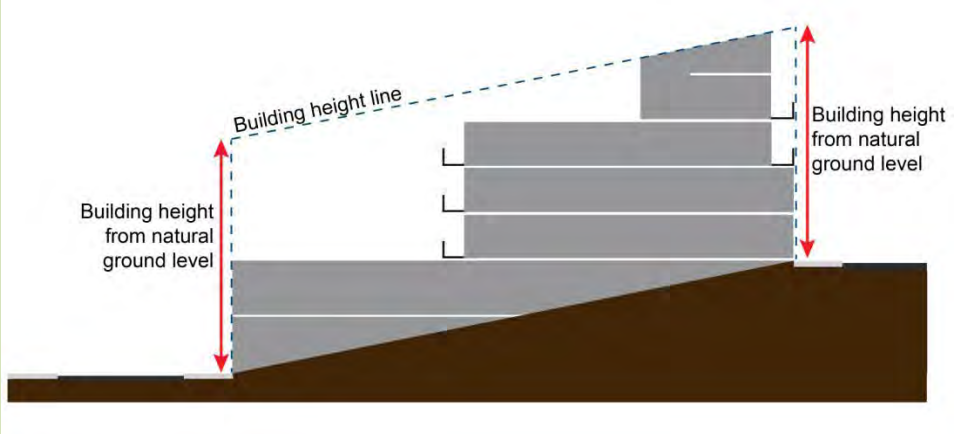
The Moreton Bay region is extensive and encompasses a range of established urban, rural and coastal areas as well as newer expanding areas. Buildings can be designed to acknowledge, interpret and express their context in order to enhance local character and identity. Character is expressed through the thoughtful interpretation of contextual design themes of the location such as the coastal or traditional urban buildings, the massing and building form, geometry of building elements, roof lines, balcony scale and treatments, choices of materials and colours.

	Coastal Character	Rural Settlement Character	Urban Character
	 (Mudjimba)	 (Narangba)	 (North Lakes)
Design themes	Shorelines, bays, coves, headlands, waves, wind, sand, boats, horizontal lines, curves	Traditional town, 'Queenslander', farm houses and farm buildings, rural town industry, butter factory	Strong definition of streets and public spaces, more solid, more privacy required
Roof form	More expansive / generous roof form, extended eves, skillions, curves, propped awnings and eves	More traditional roof forms, gables, hips, visible roof with steeper pitches	Less expansive roof forms, smaller overhangs, wall dominate visually
Balconies	More open and larger for view and lifestyle, transparent balustrades	not overly wide, wrap around, timber balustrades semi-enclosed for cold weather	More enclosed and protected for privacy, masonry balustrades, moveable shutters and screens
Materials	Light weight material, metal, timber, rendered masonry	Light weight material, timber, face brickwork	Natural masonry, more solid, concrete, hardwearing surfaces
Colours	More modern colours, metal, borrowed from coastal landscapes	Traditional, blends more with the landscape	Natural masonry, concrete
Elements	Visually light, canvas awnings, sales, masts, more horizontal, circular sections	More vertical, square sections, intricate	Vertical with combinations of massing elements

5.2 Building height

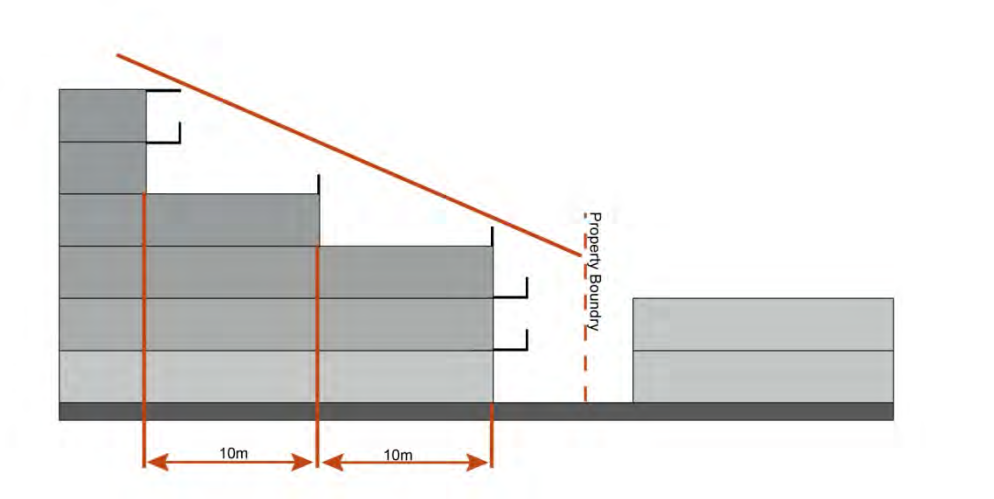
The following diagrams illustrate key features related to the performance outcomes for residential building height.

Buildings and structures have a height that responds to topographic features of the site, including slope and orientation.



Building height for slopes from front to rear.

Buildings and structures have a height that responds to the height of development on adjoining land, where contained within another precinct or zone.

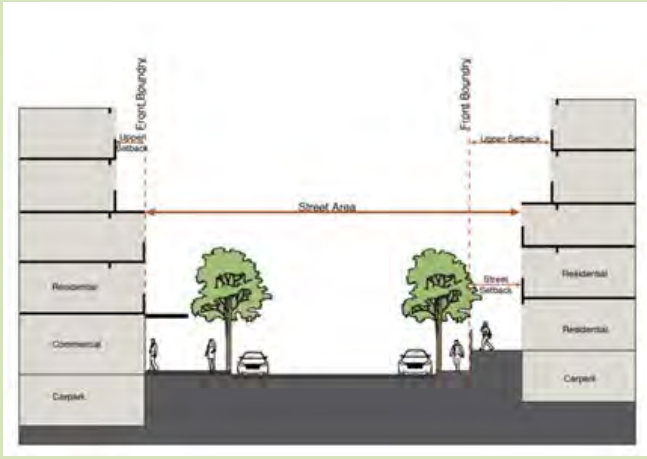


Consider transitional building height when adjoining land in a different zone. For transitioning between zones, sites directly bounding a zone with conflicting building height allowances will be required to transition heights on site by a rate of 1 storey per 10m into the site and then 2 storeys for a further 10m. Where a road separates conflicting zone heights, or is proposed between conflicting zone heights the road sufficiently creates the transition.

5.3 Setbacks

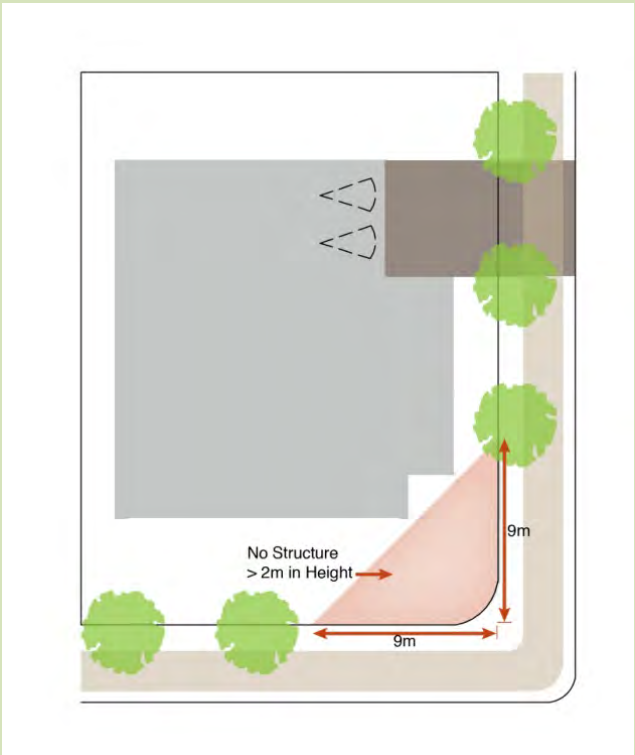
The following diagrams illustrate the residential setbacks detailed in Table 6.2.6.2.3 – Suburban neighbourhood precinct, Table 6.2.6.3.3 – Next generation neighbourhood precinct and Table 6.2.6.4.3 – Urban neighbourhood precinct of the General residential zone code.

(Maroochydore)



• On sites with commercial uses at ground floor, no ground floor setback from the street should be created.
• Upper level setbacks above podium height should contribute to the creation of a consistent podium height and streetscape character.

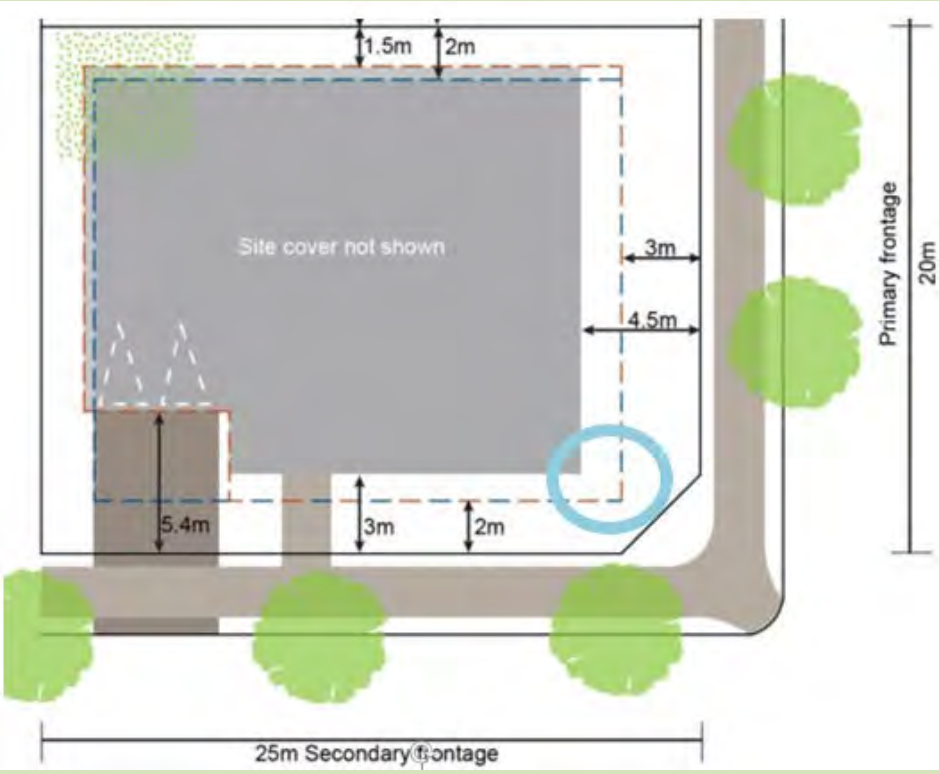
(Kawana)
Ground floor awnings, architectural features, sunshades, screens and artworks may be constructed within front setback areas, where they will improve architectural outcomes and articulation.



Corner truncations are to remain free of structures to maintain sight distances.

Measuring setbacks on a corner lot

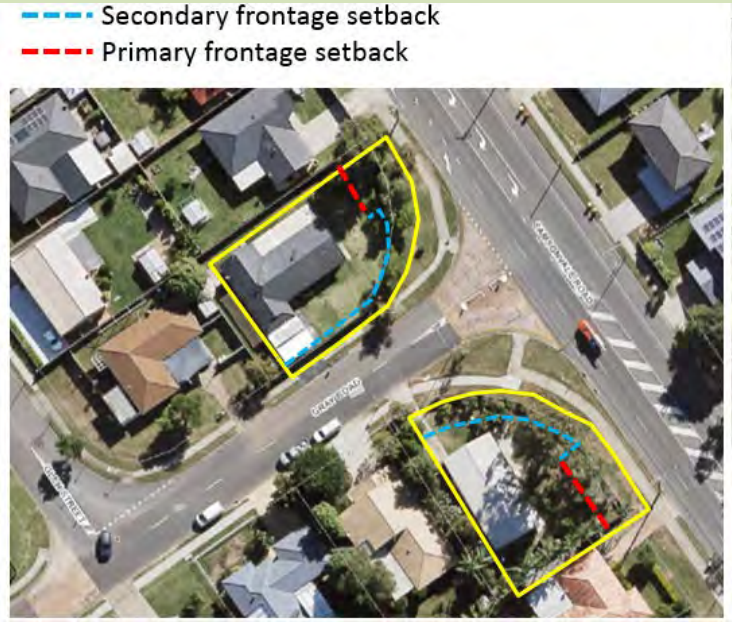
Measure back from the primary and secondary boundary and where they intersect on the corner is the setback.



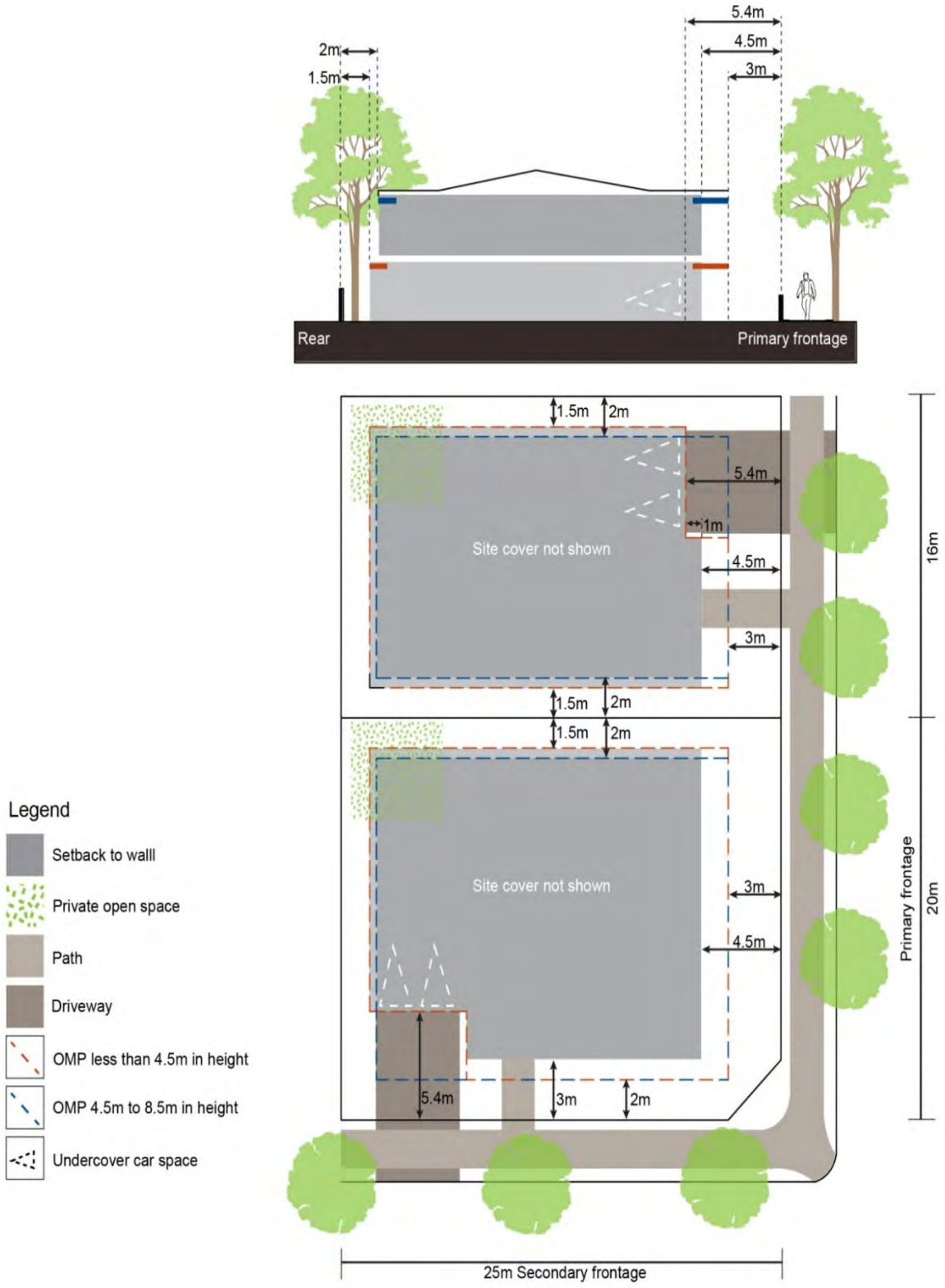
The above is an example from the General residential zone – Suburban neighbourhood precinct

In some circumstances a three chord truncation larger than 14.196m x 14.196m, (or a five chord truncation larger than 14.920m x 14.920m), will result in the projection of these setback lines extending into road reserve.

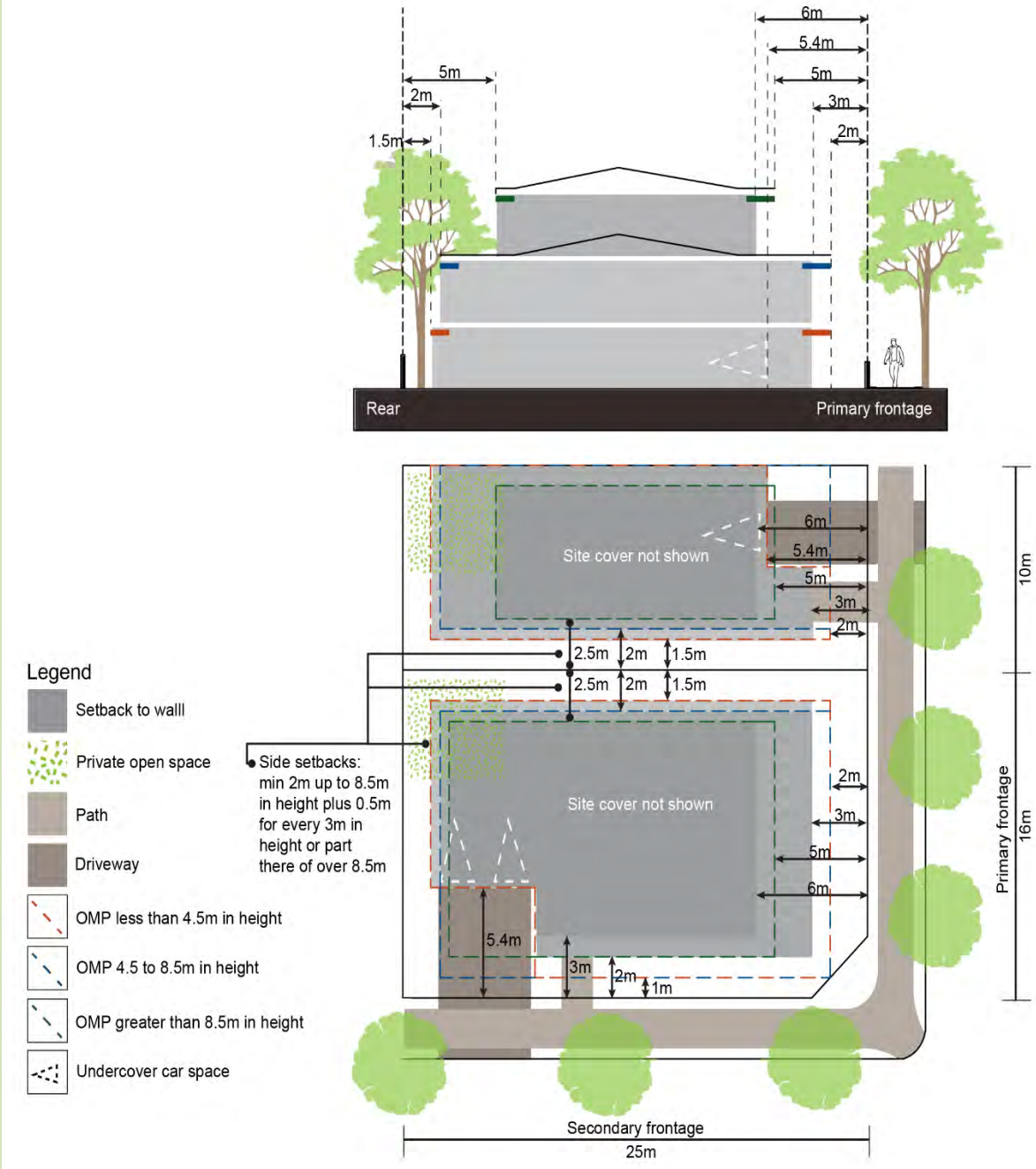
To Measure – Apply the secondary frontage to the entire truncation.



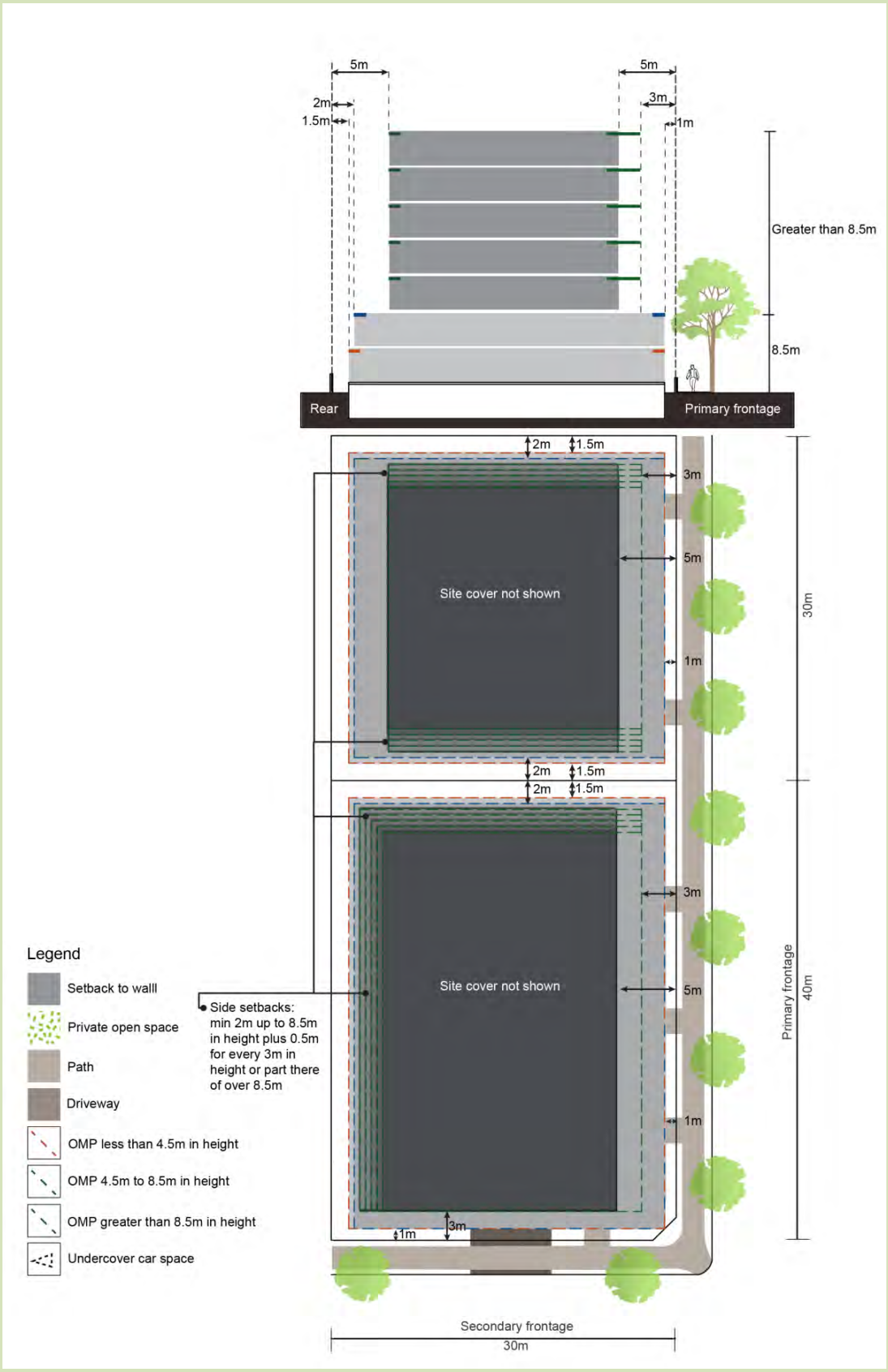
Setbacks: Suburban neighbourhood precinct example



Setbacks: Next generation neighbourhood precinct example



Setbacks: Urban neighbourhood precinct example



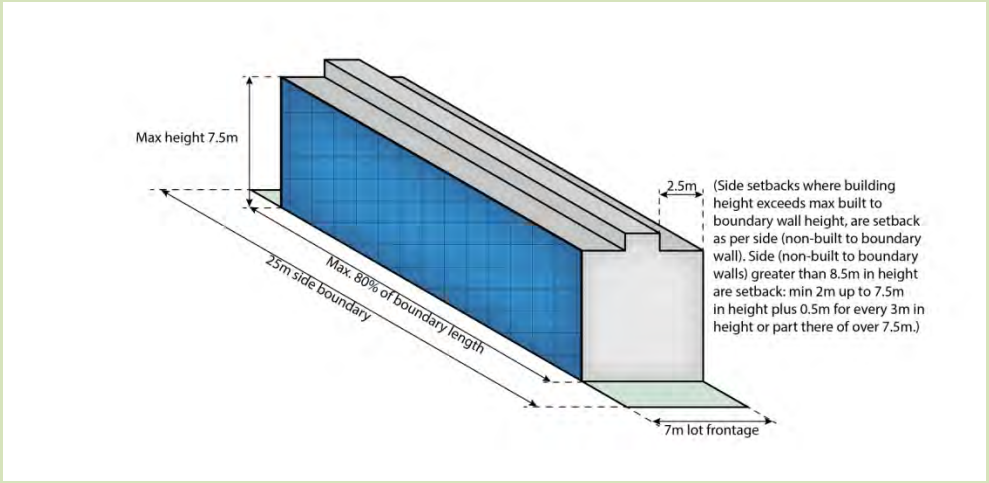
Measuring the primary frontage on corner lots

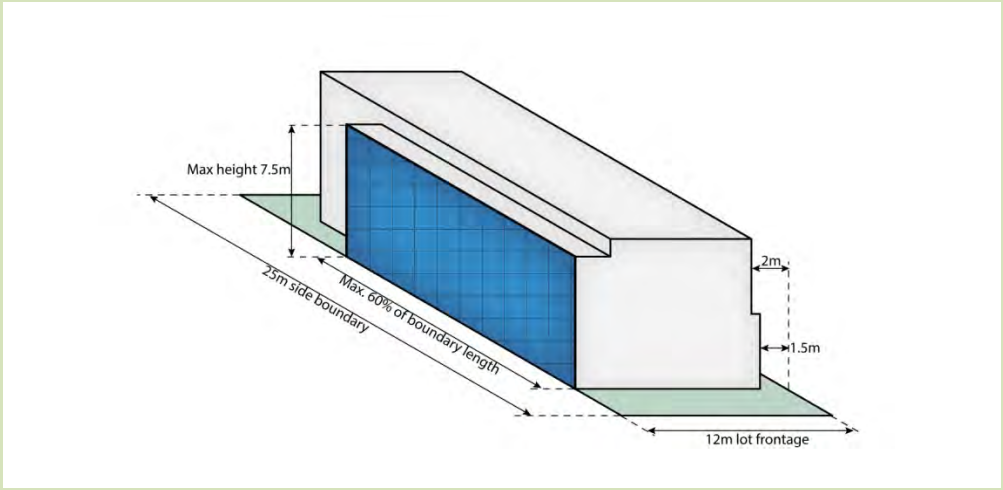
Halve the truncation length and add it to the Primary and secondary frontage

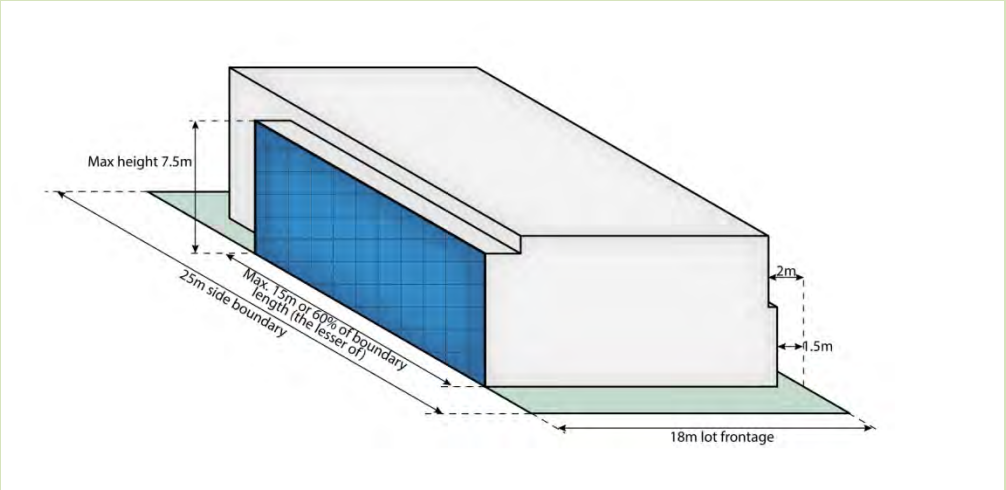
5.4 Setbacks – Built to boundary walls

The following diagrams illustrate the built to boundary length and heights detailed in Table 6.2.6.3.4 – Next generation neighbourhood precinct and Table 6.2.6.4.4 – Urban neighbourhood precinct of the General residential zone.

Built to boundary walls: Next generation neighbourhood precinct examples

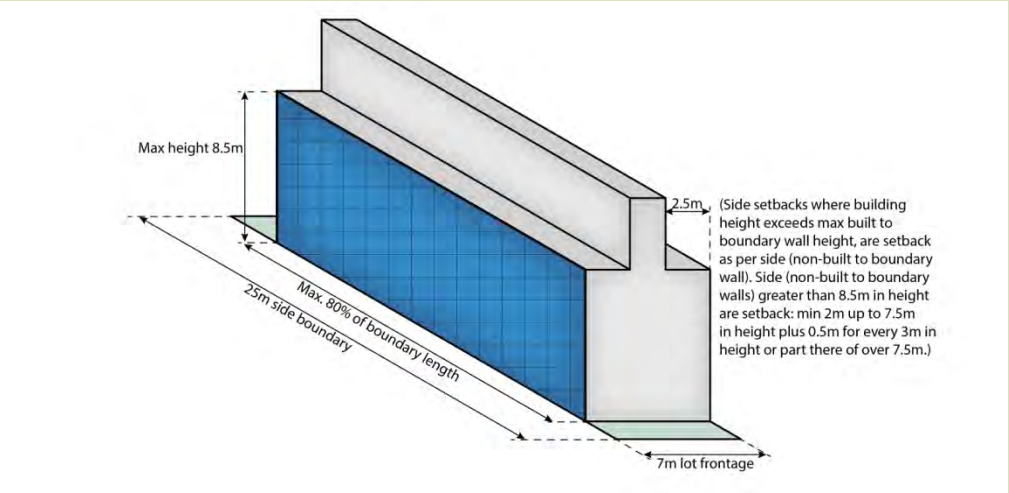


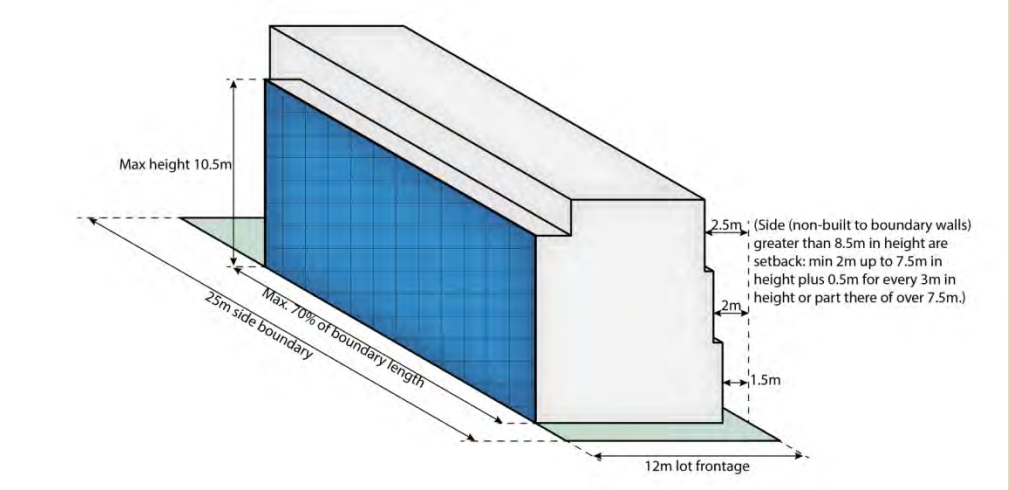


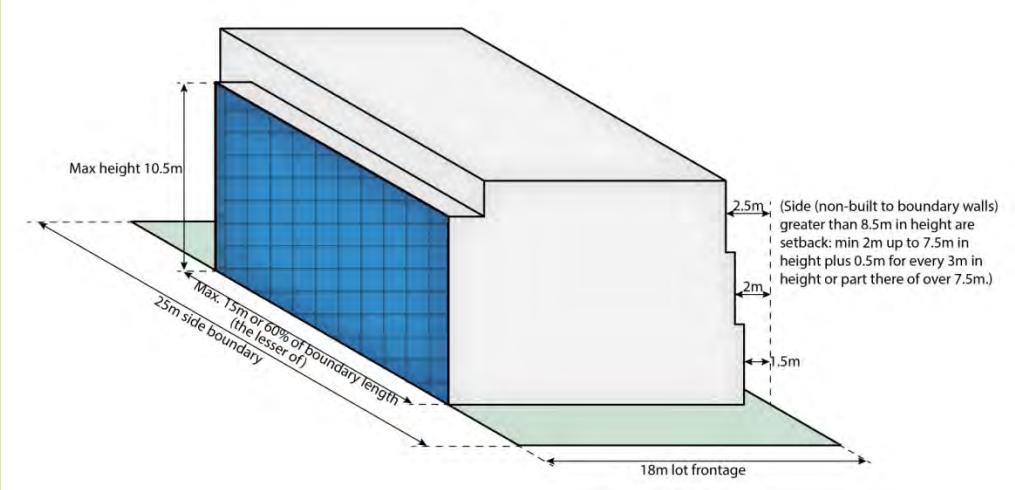


Note: adjoining lot has a frontage less than 18m.

Built to boundary walls: Urban neighbourhood precinct examples



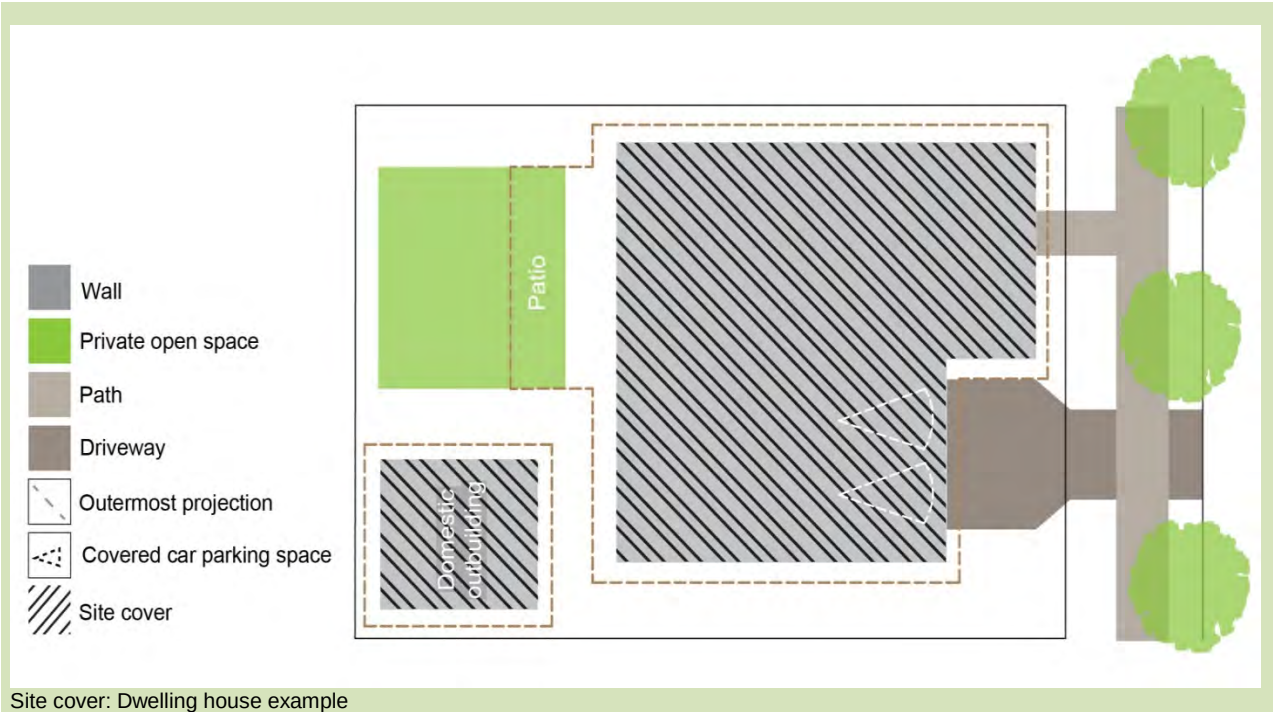




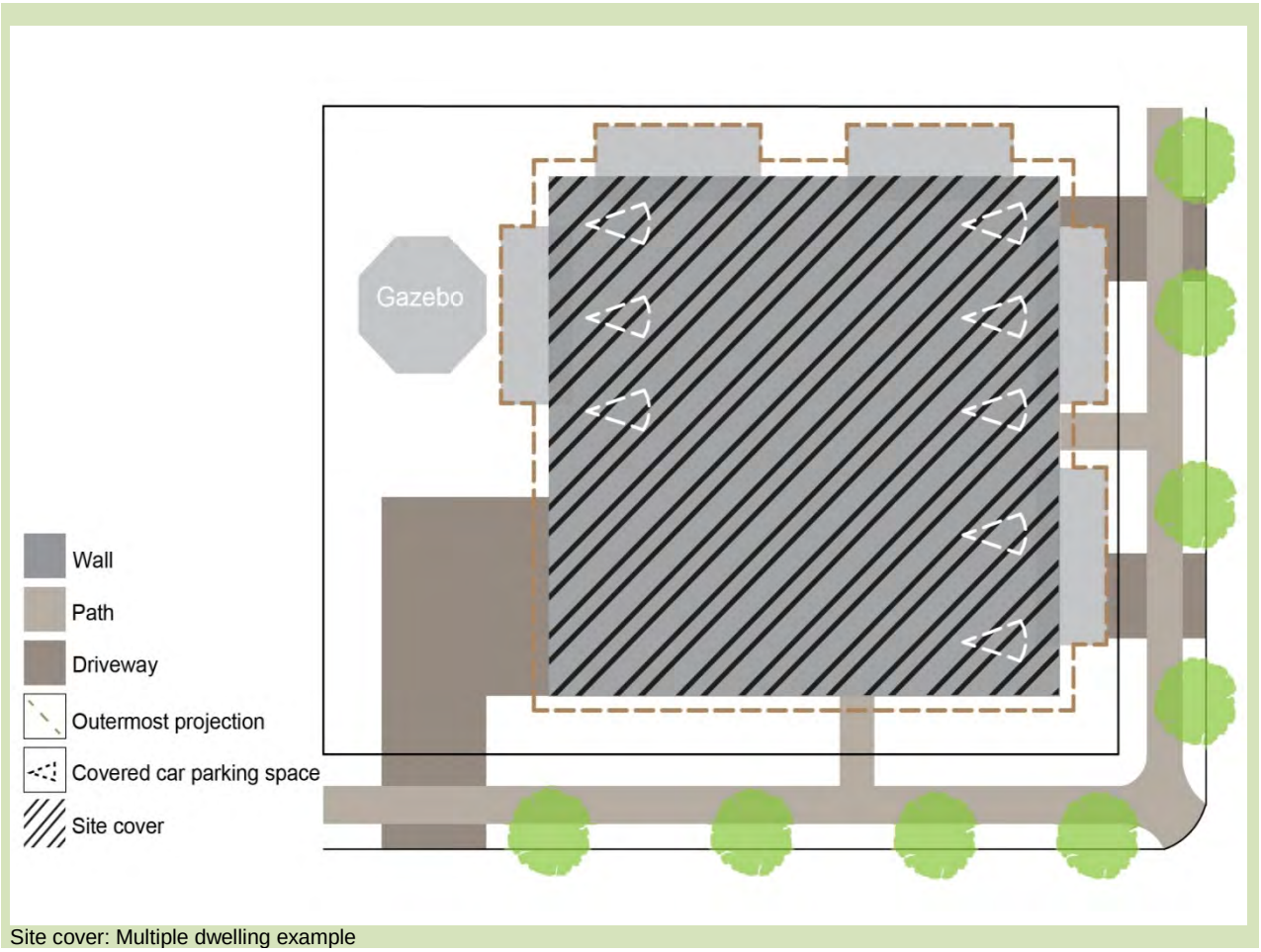
Note: adjoining lot is less than 18m frontage

5.5 Site cover

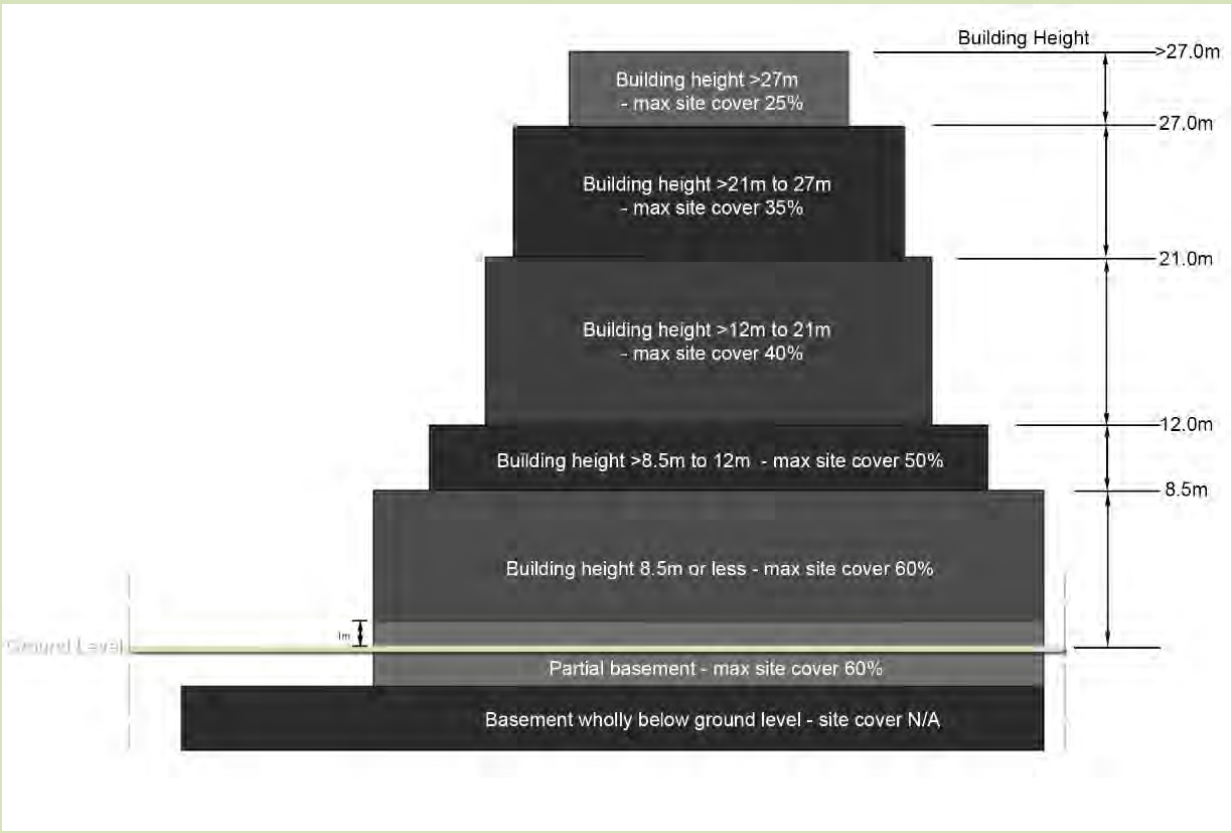
The following diagrams illustrate those parts of a residential building included in the calculation of site cover.



Site cover: Dwelling house example



Site cover: Multiple dwelling example

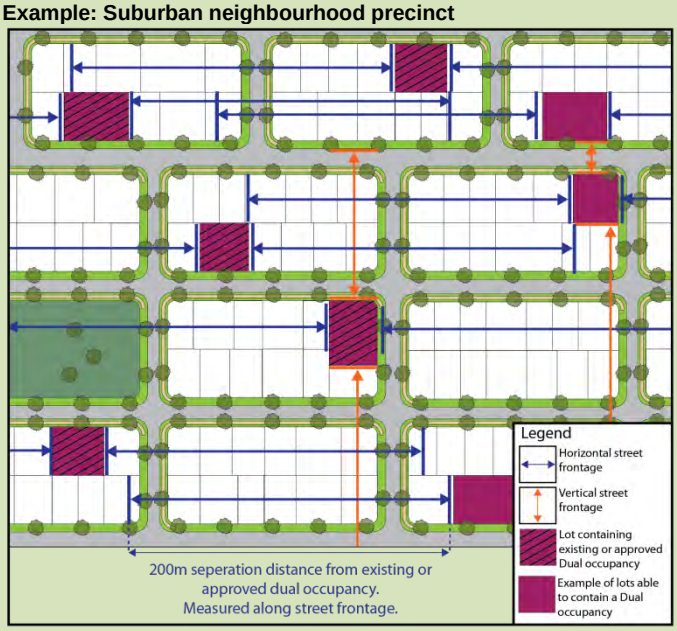


Site cover: Percentage vs Building height

5.6 Dual occupancy dispersal

Dwelling dispersal, described previously as 'salt and peppering' is achieved in the planning scheme through provisions in the Reconfiguring a lot code requiring different number of lot types depending on the zone or precinct and restricting the number of lots of the same type in a row. While this will be effective in the development of new areas of the region there are numerous established areas within the region that have the potential to result in the clustering of one housing typology unless additional design controls are applied. For example Dual occupancies (traditional) in the Suburban and Next generation neighbourhood precincts. The following diagrams illustrate different measures that can be used to ensure the appropriate dispersal of this dwelling type.

Example: Suburban neighbourhood precinct



A Dual occupancy is not located within 200m (measured along the street alignment) of a lot containing an existing or approved dual occupancy.

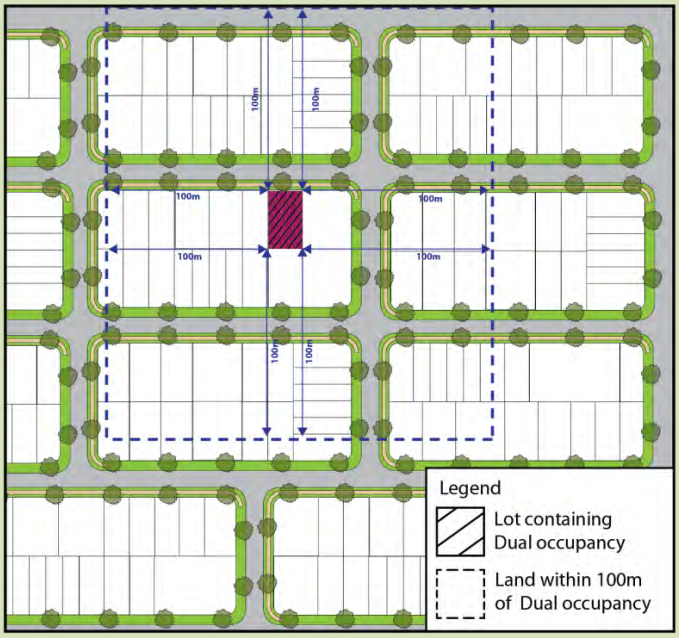
Example: Next generation neighbourhood precinct

No more than 20% of sites within a block contain an existing or approved Dual occupancy. Dual occupancies should be separated by at least 1 lot not containing a Dual occupancy.

Example: Next generation neighbourhood precinct

A Dual occupancy is separated by a minimum of 6 lots (running along the street frontage) from another lot containing an existing or approved Dual occupancy.

Example: Next generation neighbourhood precinct



A Dual occupancy is not located within 100m (in all directions of an existing or approved Dual occupancy.

6. Streetscape

It is important to ensure that residential development contributes towards attractive streetscapes and security for occupants and passers-by. For these reasons development should front streets and public places providing casual surveillance and activity, whilst ensuring adequate privacy for occupants. The following diagrams illustrate the principles of integrated streetscapes, casual surveillance, screening and building appearance that contribute to attractive streetscapes.

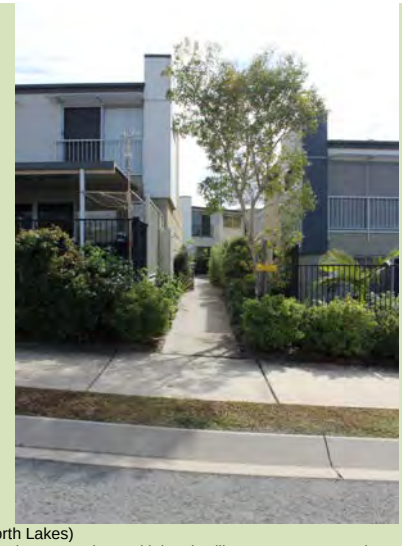
(North Lakes)

6.1 Integrated development

Whether in a new greenfield subdivision or infilling into an established residential neighbourhood, ensuring that new dwellings are integrated into the streetscape is critical. Development will be designed to maintain and enhance connectivity with the neighbourhood through orientation of buildings to the street and other public spaces and pathways linking local destinations.

Multiple dwellings

(North lakes)
High fences and gated communities are avoided. Dwelling address streets with a front door, pedestrian access and landscaping to enhance the streetscape. Private open space areas are located to the side or rear where privacy can be provided away from the street frontage.



(North Lakes)
Townhouse style Multiple dwellings can ensure integration through ensuring dwelling address the external streets and public spaces, and providing pedestrian connections that link to the wider street network.

(Maroochydore)
Pedestrian and cycle pathways and links are included in between dwellings as part of a town house development or other managed community. Links should provide the most direct connection from the development to parks, centres or neighbourhood hubs.

(Chermside)
Apartment buildings ensure integration with the streetscape through clear entry points, street number and landscaping.

(Brightwater)
Townhouse style Multiple dwellings should minimise the extent of boundary fencing adjoining streets and public spaces to maintain connectivity, sightlines and surveillance.

Individual dwellings and subdivision

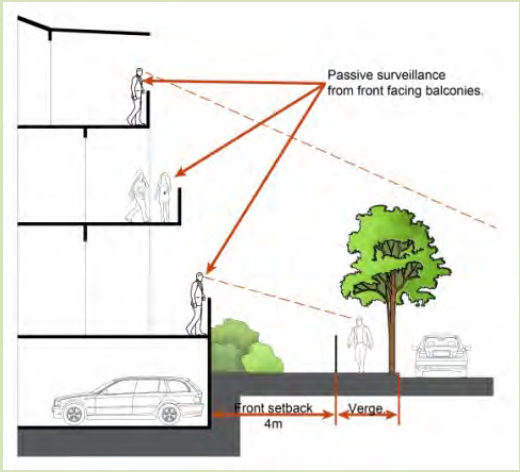
(Maroochydore)
Pedestrian and cycle pathways and links are included in between lots. Links should provide the most direct connection from the development to parks, centres or neighbourhood hubs.

(Maroochydore)
The front door and pedestrian entry as well as habitable room windows should face all primary frontages (whether streets or public open space).

(Maroochydore)
Front door, low fence or garden, pedestrian gate and path to front door all face the primary frontage.

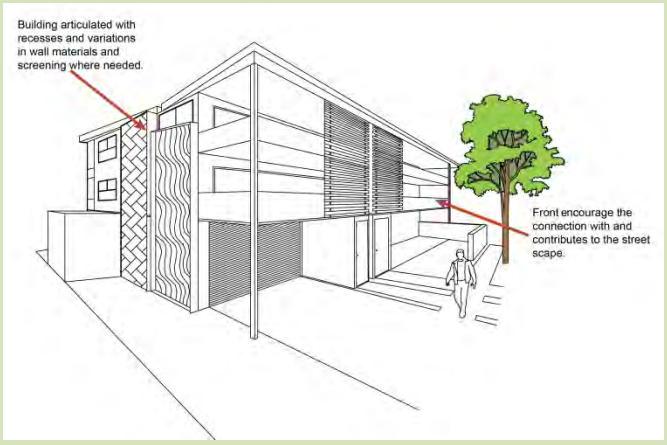
6.2 Casual surveillance

Through building design we can improve the safety of streets and neighbourhoods. Designing dwellings to orientate living areas and active frontages toward streets and other public places increases the level of casual surveillance. In designing dwellings with living areas orientated to public places, we need to consider the privacy of residents. Clever building and landscape design can be used to provide adequate levels of privacy while ensuring casual surveillance of public spaces.



(Maroochydore)
If the proposal is adjacent to a park or other public space, the space should be substantially fronted by dwellings, whilst providing clear separation between public and private land and provide outlook for as many dwellings and other occupancies as practicable whilst avoiding a sense of privatisation of the public park.

(Caloundra)



(Maroochydore)
Building frontages with residential uses at ground floor should:

- provide individual entry doors to ground level dwellings;
- provide privacy by elevating the ground floor approx. 0.5 to 1m above street level or provide landscaping in front setbacks;
- use permeable fences to a maximum height of 1.5m;
- use landscaping to cover semi-basement ventilation;
- locate less private habitable rooms, such as living room, home office, study or kitchen to the street whenever possible.

6.3 Screening – fences and walls

Screening and fencing should complement the streetscape character and help define public from private places. Screening and fencing should provide privacy to residents, without impeding casual surveillance of streets and other public places.

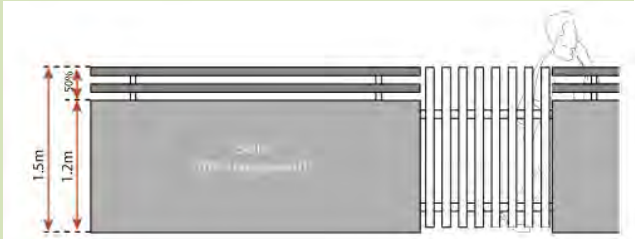
Good examples

(Maroochydore)
Example: 0% transparent, 1.2m high

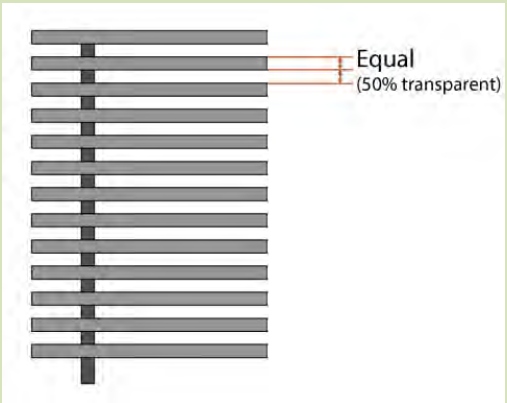
(Maroochydore)
Example: 50% transparent, 1.5m high

(Maroochydore)
Example: 85% transparent, 1.8m high

(Maroochydore)
Example: No front fencing, 1.8m high fencing at the building line



Example: Combination fencing, 0% transparent to 1.2m then 50% transparent from 1.2 to 1.5.



Example: How to calculate transparency

(Maroochydore)
Where solid fences are unavoidable they should include variation in material, reduce flat surfaces and incorporate landscaping in front to reduce visual dominance and assist in the prevention of graffiti.

(Maroochydore)
Combination of solid and transparent fencing with landscaping to define private areas.

Bad examples

(Maroochydore)
Fencing adjoining pedestrian connections and pathways should maintain casual surveillance. A combination of solid and transparent fencing is recommended to provide safety and security while maintaining surveillance.

(Maroochydore)
Solid front fencing that is higher than 1.2m dominates the streetscape. The example above would be improved by bringing the building forward, locating private open space to the side or rear and having a solid fence not exceeding 1.2m in height with a pedestrian gate.

(Kelvin Grove)
Where a retaining wall is unavoidable the height of the retaining wall and the fence should combined and not exceed maximum fencing requirements. Additionally, the fence can be set back to allow low maintenance landscaping on top of the retaining wall in front of the fence.

(Maroochydore)
Solid front fencing that is higher than 1.2m dominates the streetscape.

6.4 Building appearance

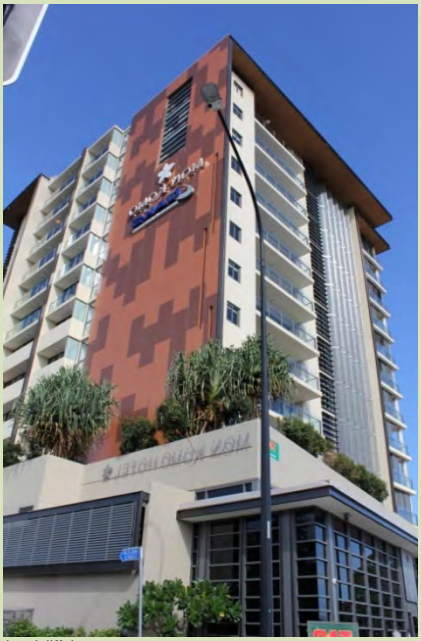
How a building looks when viewed from an adjacent street or other public area is the most evident feature of how well a building integrates into its streetscape. Buildings should be designed to:

a) incorporate architectural features into the building façade at street level to create human scale;
b) promote identity and diversity between adjacent dwellings;
c) enable individual dwellings to be identified and directly accessible from public streets and communal areas;
d) visually integrate with the intended character of the precinct through appropriate design and materials;
e) avoid blank walls (excluding built to boundary walls) through articulation and architectural treatments to create visual interest;
f) include roof forms that provide visual interest to both the building and the skyline and effectively screen service structures, plant and equipment from view of the street and adjoining buildings;
g) provide a design that enables permeability between buildings;
h) create attractive backs and sides of buildings where visible from public spaces;
i) ensure domestic outbuildings do not dominate the street frontage and do not have a negative impact on the streetscape character;
j) ensure that tall buildings provide architectural variation through a distinct top, middle and base section.

(Maroochydore)
Servicing and utility elements (security grills/screens, car park entry doors, shading and screening structures, signage, drain pipes, air conditioning units, lift over-runs, plant and communication equipment, and other building services) should be screened or designed as part of the building.

(Maroochydore)
Building bulk and blank walls should be reduced through the use of architectural features, recesses and projections, balconies and variations in materials and finishes.

(Maroochydore)
Windows and balconies should overlook the street and other public places.



(Redcliffe)
Blank walls fronting the street should be avoided.

(Chermside)
High buildings provide vertical articulation through a distinct top, middle and base section.

(Maroochydore)

- Garages should be setback at least 1m behind the main building line.
- Car ports and domestic outbuildings should not be located within the front setback.
- For 2 storey buildings the garage should be recessed back from the second storey.

(Cotton Tree)

- Facades should be designed with an appropriate scale, rhythm and proportion, which respond to the building's use and the site context.
- The design of buildings and the materials and finishes used should respect the existing or future character of the area.

(Redcliffe)

(Maroochydore)

- Dwellings include elements (colours, materials and finishes) and features (roof forms, balconies, porticos) that distinguish one dwelling from another.
- Pedestrian entries should be easily identifiable.

(Maroochydore)

- Roofs include pitches, gables, skillions or other features.
- Variation in colours textures and materials, recesses projections lines (horizontal, verticle, angular).

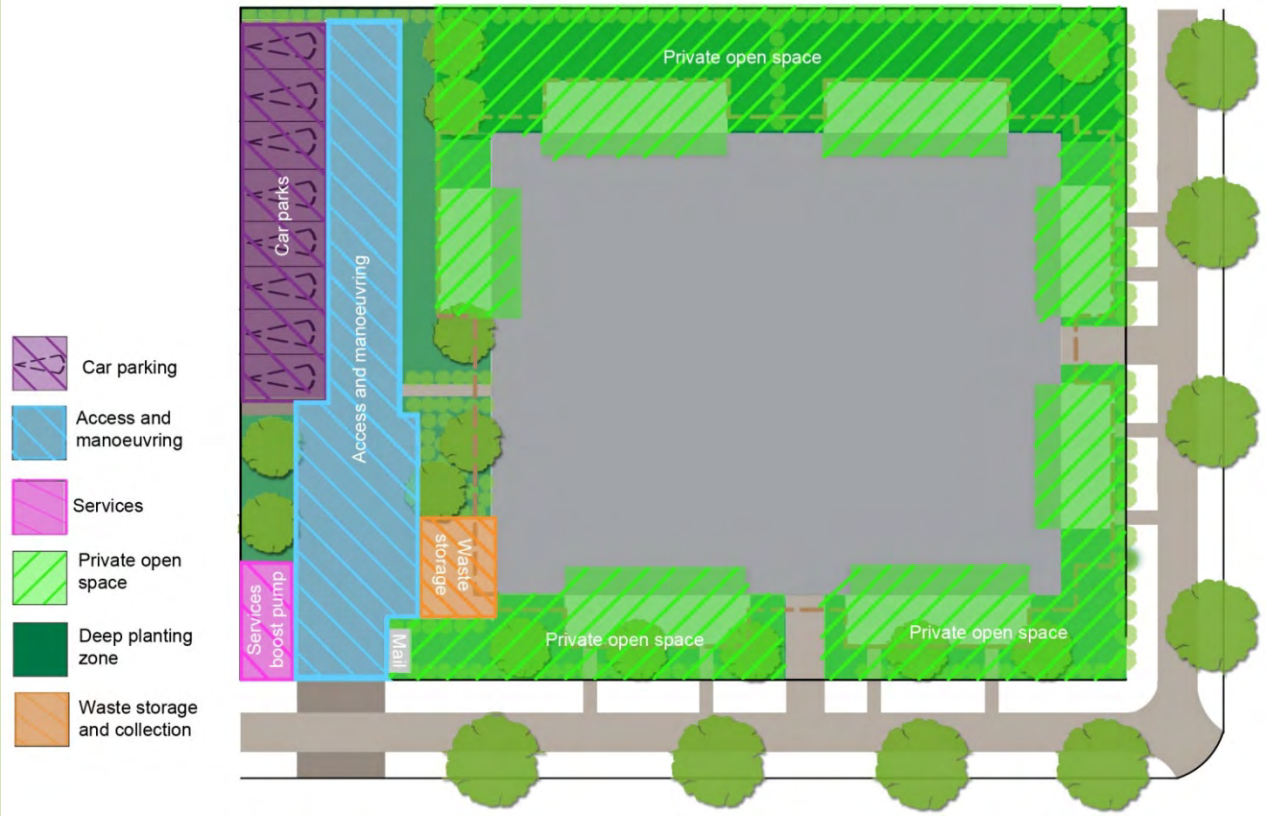
7. Site planning and design

(North Lakes)

7.1 Site area

When looking for an allotment to develop or designing development on a particular allotment, consideration needs to be given to all the elements that take up land area and will ultimately influence the size of the allotment needed. Elements such as vehicle access; manoeuvring and parking; deep planting areas and setbacks; bin enclosures; outside drying areas and private open spaces all need to be integrated into the design of buildings and will impact on the potential yield on a site.

Car parking +
Access and manoeuvring +
Services +
Waste storage and collection +
Private open space +
Deep planting



It is important that the development is located on a lot which has an area and dimensions capable of accommodating a well-designed and integrated building and associated facilities including:

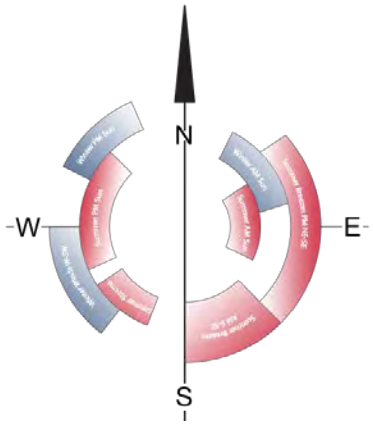
a. vehicle access, parking and manoeuvring areas;
b. efficient and useable communal (for Rooming accommodation or Retirement facility with dependant living) and private open space areas;
c. deep planting zones and landscaping;
d. adequate buffering to adjacent properties.

The following table indicates an indicative minimum area and minimum primary road frontage, depending on the overall height of the proposed building.

Height of building	Minimum lot area	Minimum primary road frontage
12m or less	800m^2	20m
>12m - 21m	1000m^2	25m
>21m - 27m	1600m^2	30m
>27m	2400m^2	35m

7.2 Private open space

The provision of private open space in any residential development is critical, particularly in a sub-tropical climate, as found in South-East Queensland.



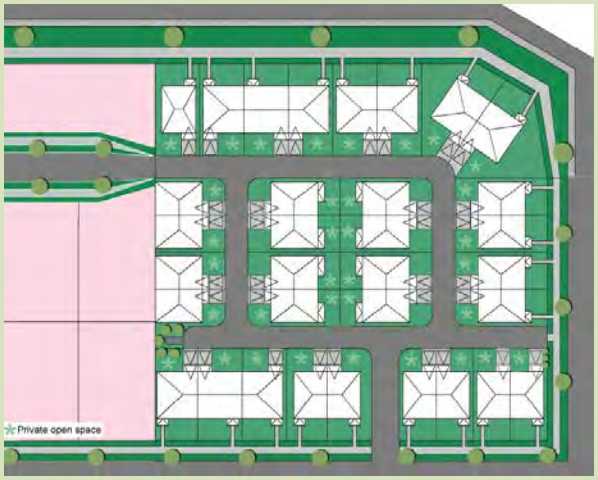
The location and orientation of private open space is a critical element of good site planning. From mid-Autumn to mid-Spring, the sun tracks a path through our northern hemisphere making the southern sides of dwellings, shaded, cold and uninviting areas. Locating private open space and by association living areas on the northern side of buildings, improves access to warmth and light during the coolest half of the year.

Private open space also needs to be carefully located to provide a usable and functional private area for the user. With dwelling diversity comes a variety of private open space options, no longer is the backyard the only or even the best solution. Ideally the primary private open space area for a ground floor dwelling is located away from public areas to maintain privacy. This does not preclude dwellings from containing small front gardens etc. as these contribute greatly to the amenity of streetscapes.

While front yards have the ability to contribute greatly to casual surveillance and neighbourly interaction there is also a risk that site specific solutions implemented by an owner or tenant (e.g. high solid fencing, reeds etc.) can more often than not, have an adverse impact on streetscape amenity and casual surveillance.

Above ground dwellings are able to implement dwelling or site-specific solutions to ensure privacy while maintaining casual surveillance. Therefore, the private open space areas for above ground dwellings are encouraged to adjoin and address streets and public areas.

Ground level dwellings



Example: Multiple dwelling, townhouse

(Fitzgibbon)

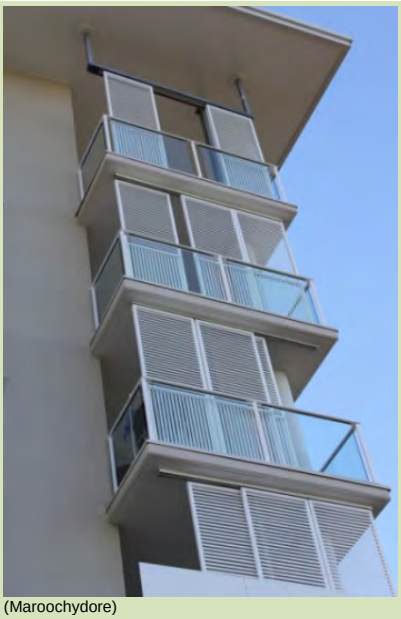
For ground floor dwellings private, open space should be located behind the main building line and not in the front building setbacks.

Example: Dwelling house on a narrow lot.

For ground floor dwellings private open space can be provided in the form of private courtyards directly accessible from living areas. It is important to ensure that courtyards are generous in size, well landscaped and allow good light penetration into apartments.

Above ground dwellings

(Maroochydore)
Provide balconies with operable screens, juliet balconies or operable walls/sliding doors with a balustrade in specific locations where noise or high winds prohibit other solutions e.g. along rail corridors, on busy roads or in tower buildings.

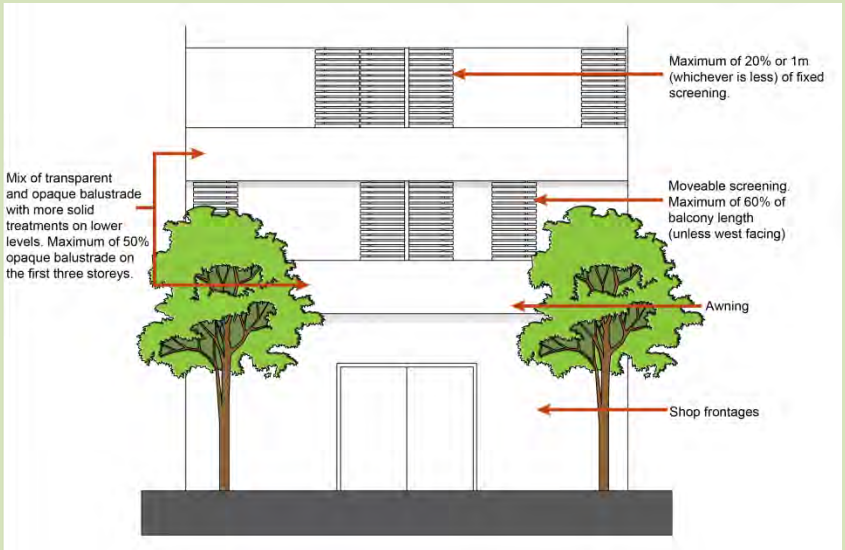


(Maroochydore)
Sun screens, pergolas, shutters and operable walls should be utilised to control sunlight and wind.

(Kawana)
Where balconies are used to house equipment and plant such as clothes drying, air conditioners etc. this equipment should be screened.

(Maroochydore)
Balconies that are partly recessed rather than projecting fully beyond the line of the building give users a better sense of privacy and utility.

(Maroochydore)
Solid balustrading can provide privacy to balconies whilst also facilitating surveillance.



7.3 Communal facilities

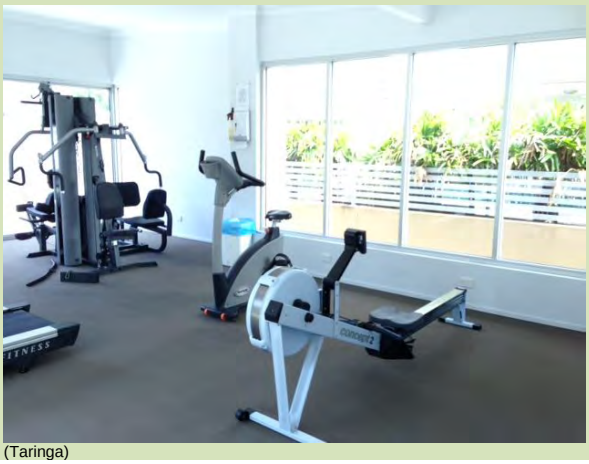
Communal facilities can play an important part of some residential uses. Where provided, communal open space should be functional and usable and located to reduce impacts on the amenity of other users of the site and adjoining properties.

(Maroochydore)
Communal open space must be usable and provide reasonable levels of amenity.

(Taringa)
Communal open space should be easily accessible from the dwellings and other occupancies it serves and of a size and design suitable for intended users.

(Tarings)
Solar access to communal open space should be maximised.

(Taringa)
Adequate irrigation, wind protection and shade should be provided.



(Taringa)

(Taringa)

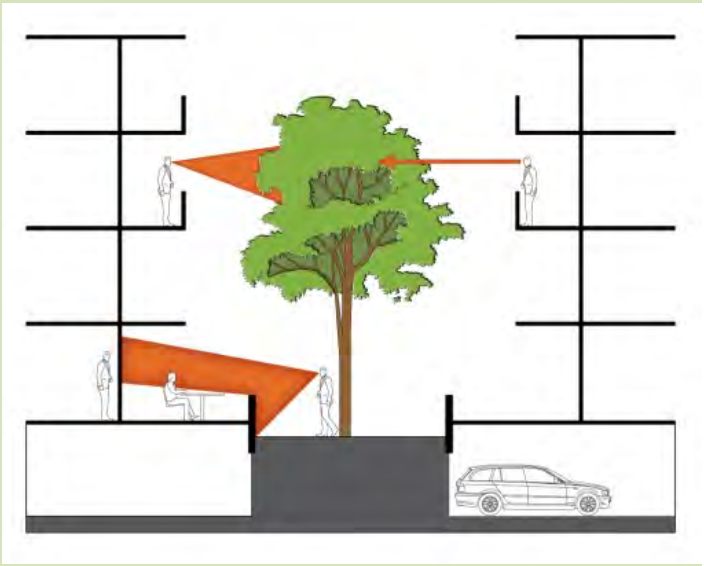
7.4 Car parking

Car parking is an essential feature of any residential development, however car parking areas that are poorly designed or located can dominate the streetscape resulting in inactive spaces at the front of dwellings and diminish the attractiveness of the street. To combat the potential impacts, site planning and building design should consider the following elements:

- garages should not dominate the streetscape;
- for apartments and townhouses:
  - parking spaces gain access via internal driveways;
  - car parking areas are located behind the front of the building;
  - semi-basement car parking should be considered in residential areas, allowing a raised ground floor for privacy and a naturally ventilated basement.

(Maroochydore)
Garages and car ports are to be setback from the frontage to reduce the visual dominance on the streetscape and allow tandem spaces for cars

(Maroochydore)
Garages adjoin a lane ensuring they do not dominate the streetscape.

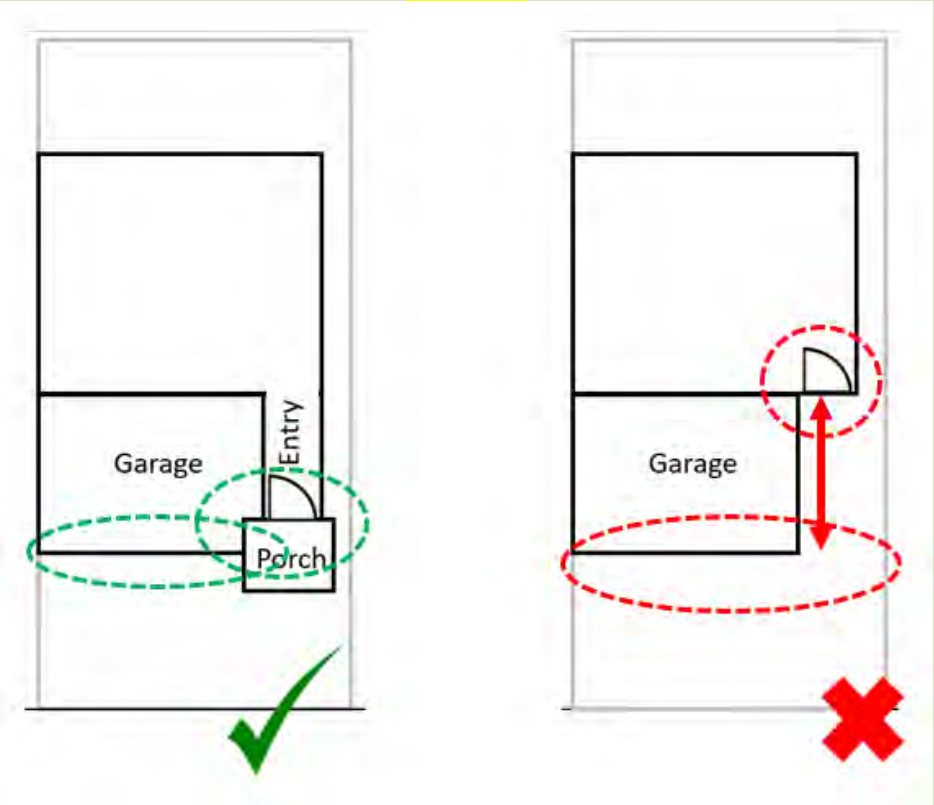


- Semi-basement car parking should be considered in residential areas, allowing a raised ground floor for privacy and a naturally ventilated basement. Landscaping should be used to screen the semi-basement.
- Basement car parking should not interfere with deep planting.

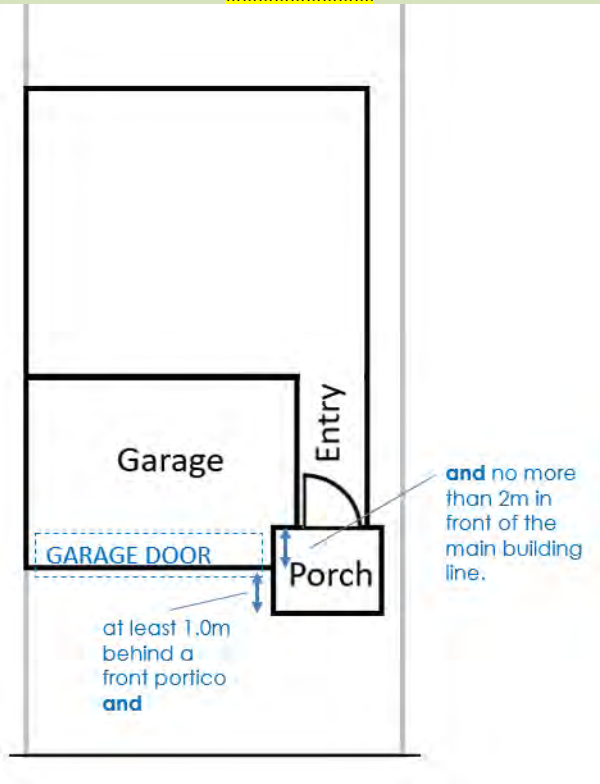
(Cotton Tree – side view. Vehicle access is from the secondary street frontage)
For Multiple dwellings:

- at grade parking areas should be avoided. Any at grade parking should be located at the rear or side of the site, away from primary frontages and include elements to reduce noise, and lighting impacts on dwellings within the site and adjoining properties;
- car parks and vehicle access ways should be located at least 1.5 metres from the windows of habitable rooms. This setback may be reduced to 1 metre where there is a fence at least 1.5 metres high or where windowsills are at least 1.4 metres above the access way;
- where provided visitor parking is to be discernible from the street; clearly signposted; not located behind a security barrier and not placed in the deep planting zones within front setback areas.

Garage and carport openings on narrow lots less than 12.5 metres



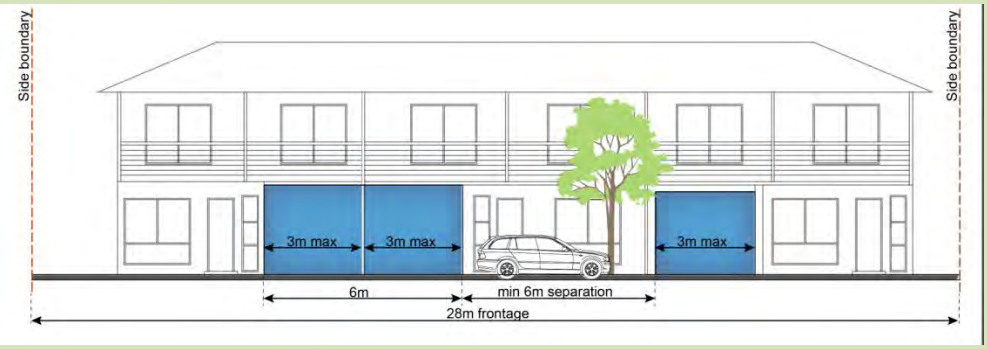
Carport/Garage openings relative to the location of a front porch/portico or the like and the main building line.



Example: Dwelling house – lot frontage less than 12.5m adjoining a laneway.

Example: Dwelling house – lot frontage less than 12.5m non-laneway frontage. Single storey is 3m if no porch/portico or the like, double storey is 6m.

Example: Dwelling house – lot frontage of 12.5m or greater.



Example: Garage and carport openings

Example: Garage and carport openings

(Suttons Beach)
The above example utilises a combination of landscaping and solid rendered balustrade to reduce the visual dominance of a protruding basement.

(Margate)
The above example uses an architectural feature forming part of the building as a way of screening ground floor parking areas.

(Clontarf - Angled side view to see screening treatments)
Mail collection, landscaping and an architectural feature forming part of the building all work together in this example to reduce the visual dominance of ground floor car parking areas.

(Clontarf - Front on view to see screening treatments in effect)
Mail collection, landscaping and an architectural feature forming part of the building all work together in this example to reduce the visual dominance of ground floor car parking areas.

(Margate - Angled side view to see dwellings adjoining the street)
The above example includes dwellings that adjoin and orientate towards the street with ground floor car parking located behind.

(Margate - Front view to see ground floor parking behind dwellings)
The above example includes dwellings that adjoin and orientate towards the street with ground floor car parking located behind.

7.5 Cycle parking

Encouraging the use of alternative transport modes such as cycling is important. Facilities should be provided in new residential developments that make it easy for residents and visitors to choose to use bicycles. The integration of secure, weather protected storage areas close to the entry/exit points of a site make it convenient for users.

(Maroochydore)

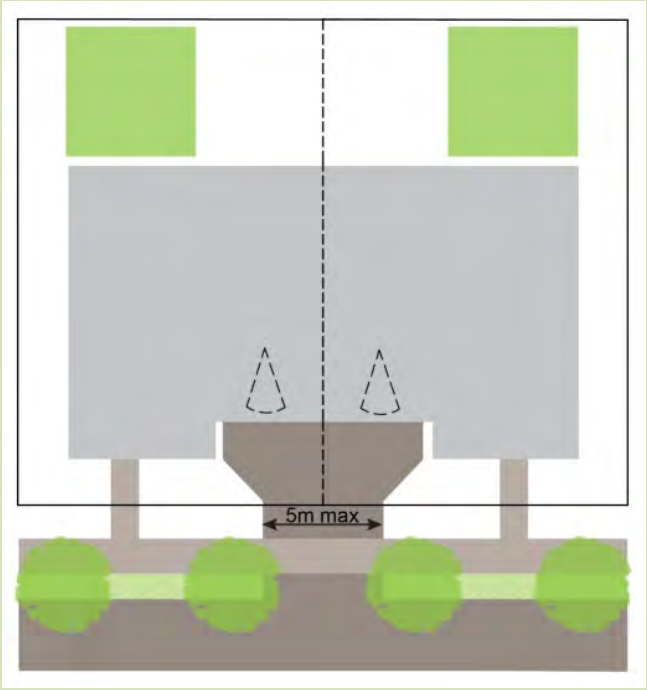
(Caboolture)

(Caboolture)

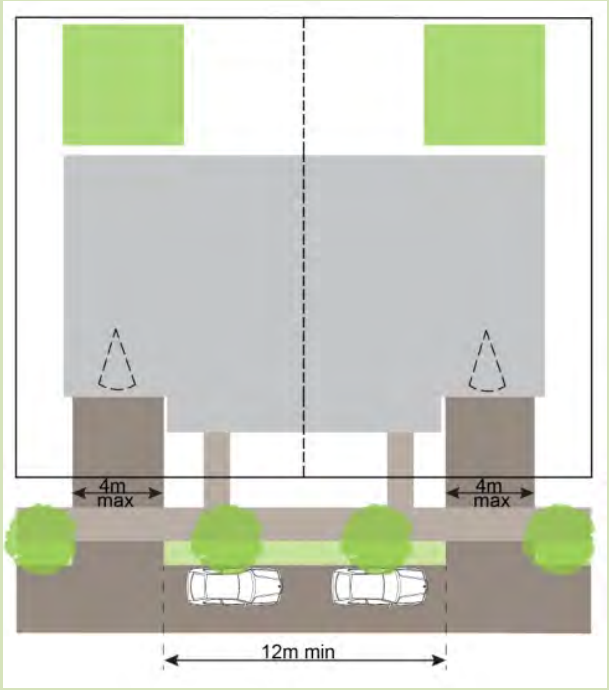
7.6 Access and driveways

Like car parking, access and driveways are an essential element of any residential development, however if poorly designed or located they dominate the streetscape with excessive hard stand areas, prevent on-street parking, impact on the safety of pedestrians and walkable neighbourhoods and have a negative impact on traffic flows and adjoining residential uses. Access and driveways should be designed to:

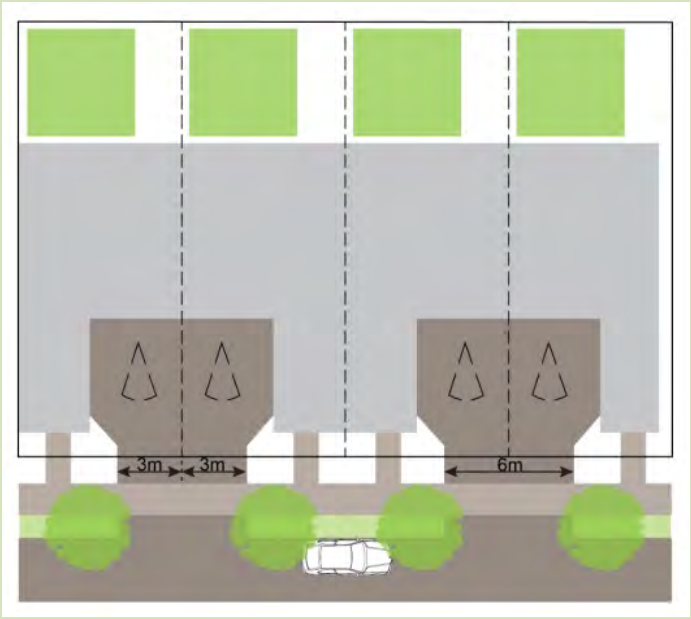
a) be consolidated, shared or paired up whenever possible;
b) where not paired up driveways should be separated to allow adequate space for on-street parking;
c) not locate excessive hardstand areas within the front setback;
d) driveways should be setback from side are rear boundaries or include screening and buffering to adjoining residential activities.



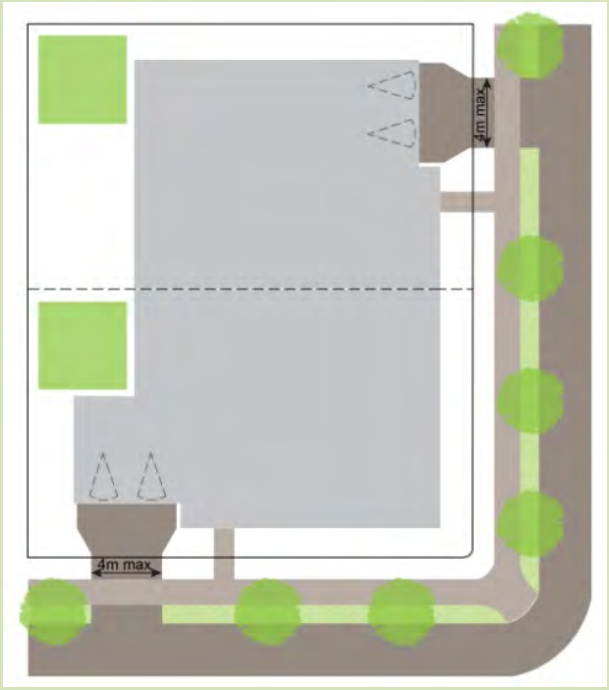
Example: Dual occupancy – shared driveway



Example: Dual occupancy – one driveway per frontage or separated.



Example: individual driveways. 1 3m wide crossover per 7.5m of primary foad frontage.



Example: Dual occupancy – corner lot separate driveways.

Example: Multiple dwelling – shared driveway.


(Cotton Tree – side view. Vehicle access is from the secondary street frontage). Developm

- ensures any vehicle movement or vehicle parking areas along the side or rear bou acoustically screened from adjoining dwellings;
- provides a 3m wide vegetated buffer next to any movement or parking areas along th rear boundary;
- is separated from habitable windows to minimise noise and fumes disturbance;
- ensures that a hardstand or maneuvering areas situated on or above ground level (e. are located to minimise noise disturbance;
- incorporate different materials, textures and colours to driveway pavements to break hard stand areas, and highlight the priority of pedestrian footpaths.

(Chermside)
Street numbers should be clearly visible.

(North Lakes)
Multiple dwelling unit identification display board for visitors and emergency vehicles.

7.7 Landscaping

The landscaping within a development provides many functions; therefore, the design of landscaping on site needs to be carefully considered to:

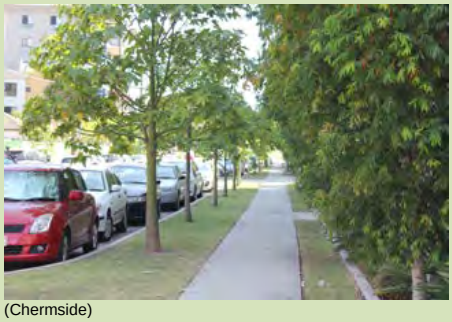
a) ensure it integrates with the overall site layout and building design;
b) reduce the urban heat island effect and enhance and improve micro-climate conditions;
c) contribute to local biodiversity;
d) consider the retention of existing mature vegetation and planting of large trees on the site;
e) integrate water sensitive urban design.

(Maroochydore)
Greening streetscape e.g. Green walls with the help of climbing species

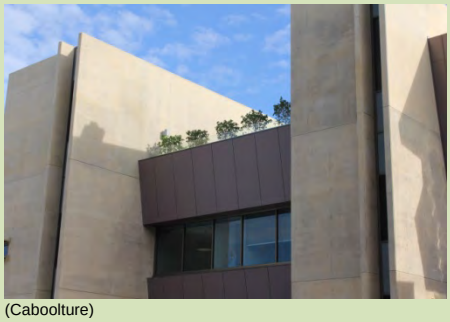
(South Bank)
Greening streetscape e.g. Green walls with the help of climbing species.

(Maroochydore)
Greening streetscape e.g. front landscaping

(Chermside)
Basement car parks that protrude above natural ground level are setback behind screen landscaping, not just street trees as shown above.



(Chermside)
Greening streetscape e.g. Street trees



(Caboolture)
Greening streetscape e.g Planter boxes

For buildings that are setback from the street frontage they should include front landscaping.

5% of the lot area contains a deep planting zone with a minimum dimension of 4m.

7.8 Calculating deep planting zone

The deep planting zones aim to provide large canopy trees with enough open space to develop naturally and reduce the risk of trees causing long-term structural problems to buildings / hard surfaces. Tree Planting Zones allow for designers to easily determine how much space is necessary to allow for large canopy trees to both meet Council permit requirements and to reduce the potential conflicts between trees and buildings. In addition to hard landscaping, for the life of the tree, storage and other detrimental activities within tree planting zones must be avoided.

Council requests the provision of large canopy trees for a number of reasons. These reasons can include (but are not limited to); replacement planting for trees being removed due to a development, maintenance of streetscape and neighbourhood character or reinforcing indigenous vegetation in an area of environmental importance.

The planting of trees can provide a number of social, communal, environmental and even financial benefits. Although a tree may be located on a single property, it can have a massive effect on the overall character and visual aesthetic of a whole neighbourhood. Trees can be used to emphasize or screen-out views. They provide a background and soften the often harsh appearance of the built urban environment. Trees can complement architecture if placed in the right locations and do not have to be used to only block views to a building. Trees can be used to control an areas microclimate and improve the local environment by improving air quality, providing shade, reducing the effects of wind and creating habitat for wildlife. Financially, trees can be used to reduce energy costs by providing shade in summer and providing a wind break in winter. Well landscaped homes are also more valuable than non-landscapes homes.

Development provides 5% of the lot area with deep planting zones with a minimum dimension of 4m.

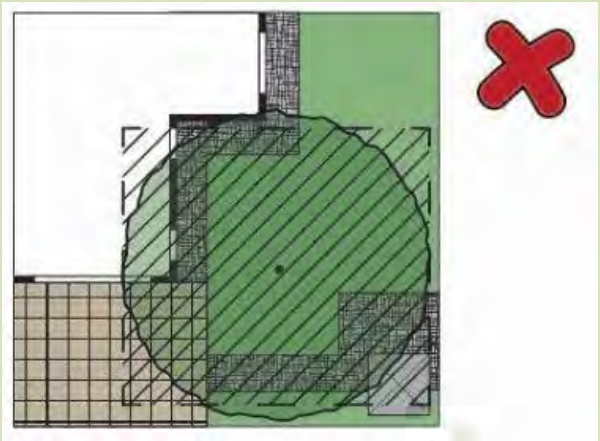
Note - Refer to Planning scheme policy - Integrated design for guidance in selecting suitable species.

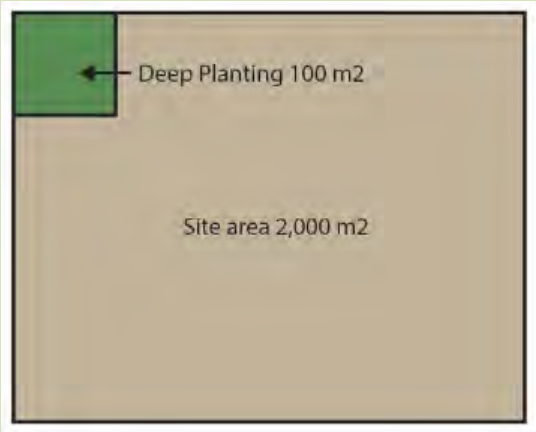
Note - Deep planting zones can be provided in private or communal open space or in front landscaping strip(s).

Deep planting zone means - and area of the site

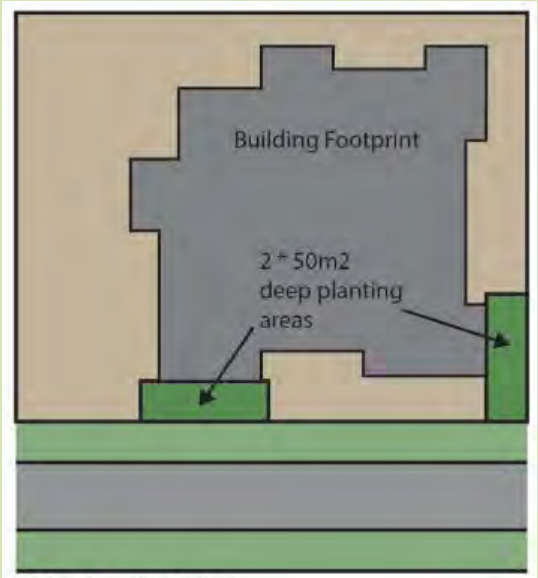
e.g. 2000m2 lot
5% = 100m2.

Tree canopy and root zones must be clear of major structures, buildings infrastructure so as to not cause potential for damage.

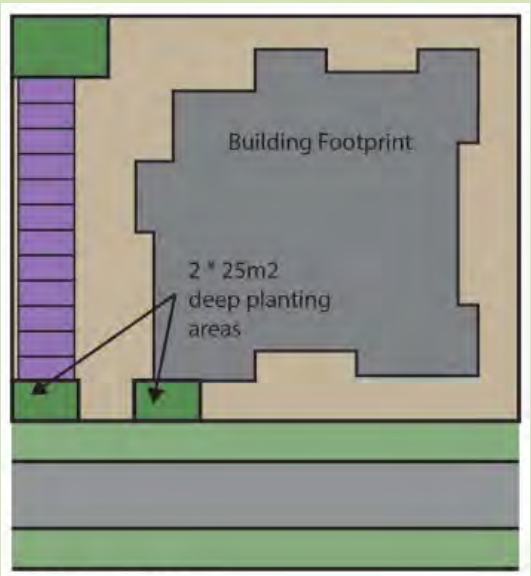




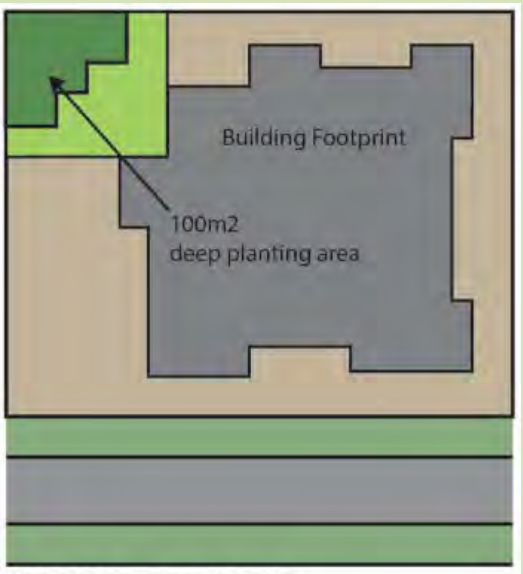
Required amount of deep planting.



In landscaping strips



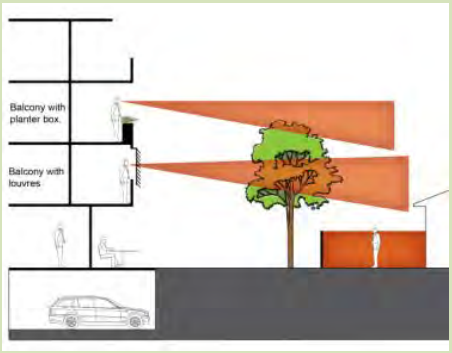
To hide parking areas



As part of communal garden

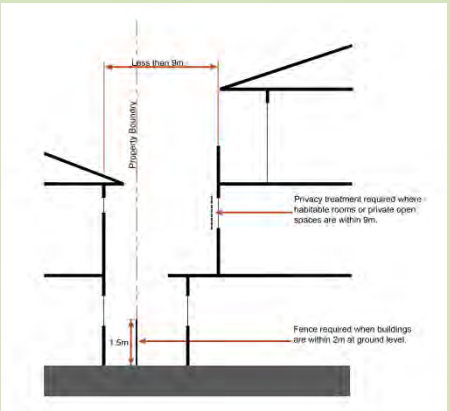
7.9 Privacy

Dwellings should be designed and located on site to limit views into the secluded private open space and habitable room windows of dwellings within a development and on adjoining properties.



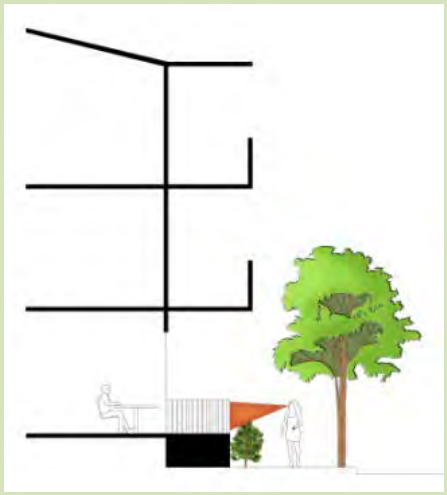
Minimise overlooking through the use of louvres and balcony planter boxes.

Locating circulation corridors at corners helps create separation between buildings.

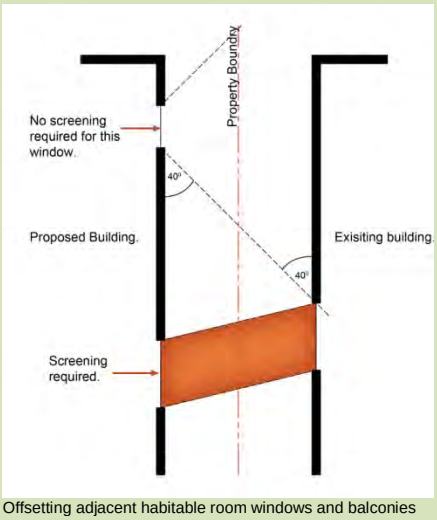


Habitable room windows, balconies, terraces, decks and patios should be designed and located to avoid direct views into secluded private open space and habitable windows of existing dwellings, within a horizontal distance of 9m.

(Maroochydore)
Solid balustrading for lower level apartments increases privacy while maintaining casual surveillance.



Raised terrace and vegetation screen provides privacy for units adjoining public or communal spaces.



Offsetting adjacent habitable room windows and balconies

(Maroochydore)
Screening can be used to direct specific views.

(Maroochydore)
Fixed screening over windows is not a desirable solution to overlooking as shown above. Windows should be offset or have an appropriate separation distance.

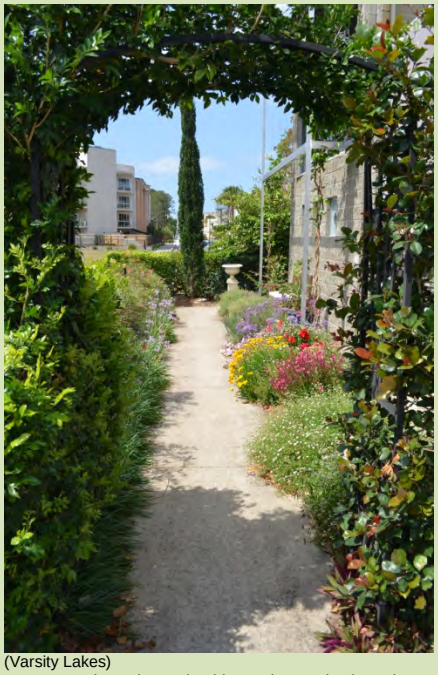
(Maroochydore)
design solutions such as louvered screens with specific views, operable or fixed vertical louvres or planter boxes along the edge of balconies should be utilised to limit sight lines. Obscure glazing is the least desirable screening method for apartments.

7.10 Subtropical design

Development is designed to consider sub-tropical climate through maintaining an open and permeable built environment maximising prevailing breezes, connect indoors and outdoors in an integrated design, incorporating landscaping and architectural features to provide shelter and reduce the impacts of climatic conditions including sun, wind and rain.

(Cotton Tree)
Breezes are blocked when screens are not carefully designed. Adjustable screens can block sun when needed and provide privacy for both occupants and neighbours.

Instead of blocking wind movement louvres or other window systems that hinge or pivot should be incorporated to allow full use of the available opening. They can also act as wind scoops, improving ventilation and air flow regulating wind speed and direction.



(Varsity Lakes)
Houses and gardens should coexist. Plantings between buildings provides visual privacy and porous ground surfaces absorb rainfall and do not obstruct overland flow of water.

(Chermside)
Balconies that are too small and too exposed do not support outdoor living as shown above. Balconies should be deep enough to gather around a table.

(Narangba)
Dwellings achieve effective transition from indoor to outdoor spaces with large windows and doors opening onto shaded verandahs and patios.

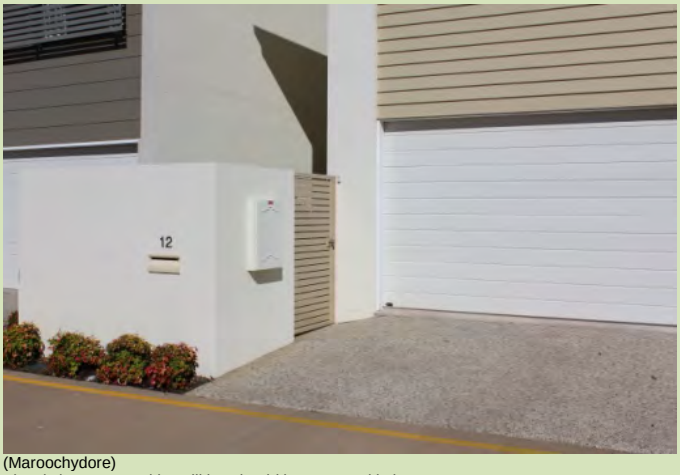
(Caboolture)
Allow large shade trees to flourish in both private and public spaces. Preserve significant shade trees as valuable community assets. Promote longevity of trees by providing sufficient unobstructed growing space above and below ground.

(Kawana)
Avoid high solid fences that block breezes.

7.11 Site services and utility areas

Site services and utility areas should be designed and located to ensure they do not dominate or visually clutter the streetscape, are easily maintained, accessible, fit for purpose and attractive and minimise the negative impacts of site services (e.g. noise, safety, visual impacts etc.) on the amenity of public areas and other dwellings.

(Maroochydore)
High fencing in line with the main building line with a gate can provide both screening for bin storage areas and ensure convenient access to collection point.



(Maroochydore)
Visual clutter created by utilities should be screened in laneways.

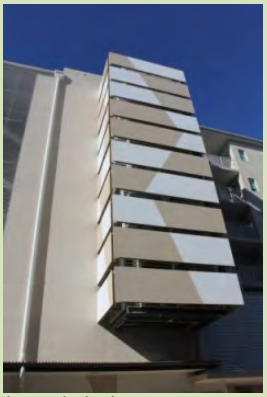
(Maroochydore)
Utilities such as bin storage, booster pumps and electrical transformers should orientate along internal driveways, perpendicular to the street frontage.

(Maroochydore)
Services such as fire hydrants and electrical transformers should not be visually prominent at the streetscape. Screening and landscaping should be utlised to reduce the visual dominance utility areas have on the streetscape and adjoining sites.

(Maroochydore)
Semitransparent screening combined with landscaping can reduce the visual dominance of utilities while maintaining their visibility.

(Kawana)
Screening of stairwells, and air conditioning units whilst maintaining ventilation.

(Kawana)
Screening of stairwells, and air conditioning units whilst maintaining ventilation.



(Maroochydore)
Screening of air conditioning units can add visual interest to the building.

(Chermside)
Mail boxes should be protected from weather, located close to the building entry so as to not create conflict between pedestrians and vehicles. Mail boxes can achieve good streetscape outcomes where they strengthen the sense of address for the building and activate the street frontage.

(Kawana)
Screening of roof top structures needs to be considered.

7.12 Lighting

Lighting is to maximise safety and minimise adverse impact on residents and neighbours.

(Caboolture)

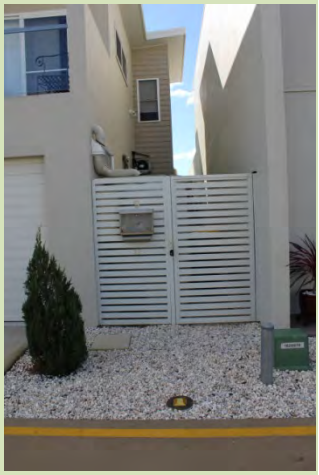
(Caboolture)

(Caboolture)

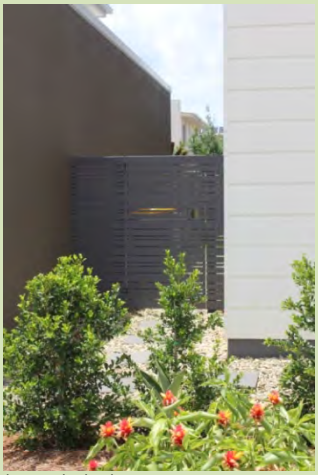
7.13 Waste management

The management of waste includes functional storage areas that do not dominate the streetscape. Storage areas can be co-located in garages, allocated car parking areas or incorporate into building design. Storage areas are not contained within dwellings.

Bin storage – Individual bins



(Maroochydore)
High fencing in line with the main building line with a gate can provide both screening for bin storage areas and ensure convenient access to collection point.



(Maroochydore)
High fencing in line with the main building line with a gate can provide both screening for bin storage areas and ensure convenient access to collection point.

(Maroochydore)
Individual bins are not to be stored in an enclosed structure (e.g. garage) unless ventilated, are able to be moved from storage area to the collection point without travelling over steps or through habitable rooms and are screened from public places.

(North Lakes)
Screened bin areas must be provided and carefully designed for Dwellings on narrow lots.

(Fitzgibbon)
Screened bin areas should be provided in lanes.

Bin storage – Shared bins

(Chermside)
Bin storage areas are to be screened and aesthetically treated to not be overbearing or visually dominate the streetscape.

(Maroochydore)
Bin storage areas are not located adjacent to living and eating areas of any residence.

(Maroochydore)
Bin storage areas are to be of a sufficient size to allow for manoeuvring and cleansing.

(North Lakes)
Accessible to the collection point.

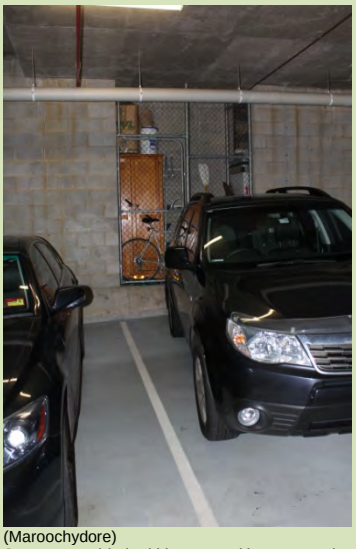
(North Lakes)

(Redcliffe)
Covered bin storage areas should be well ventilated.

7.14 Storage

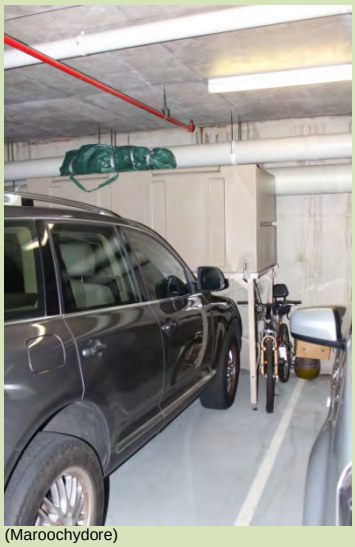
Adequate storage facilities should be provided for each dwelling.

(Maroochydore)
Each dwelling should have convenient access to secure storage. Storage spaces should be clear of any services and other obstacles.



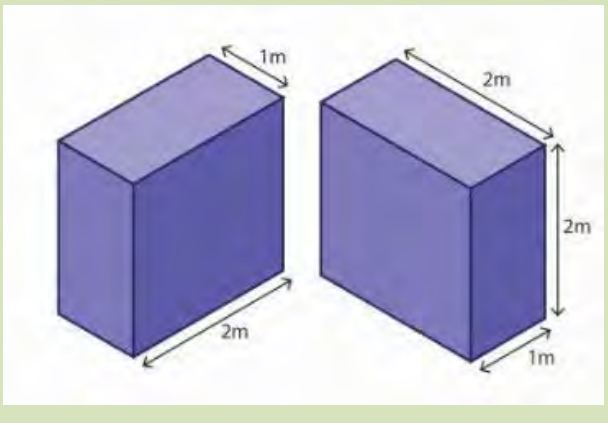
(Maroochydore)
Storage provided within car parking areas should be easily accessible.

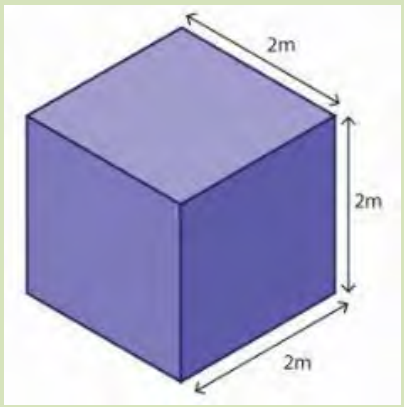
(Maroochydore)
Storage space does not include bicycle parking and should be provided in addition to the required bicycle parking space.

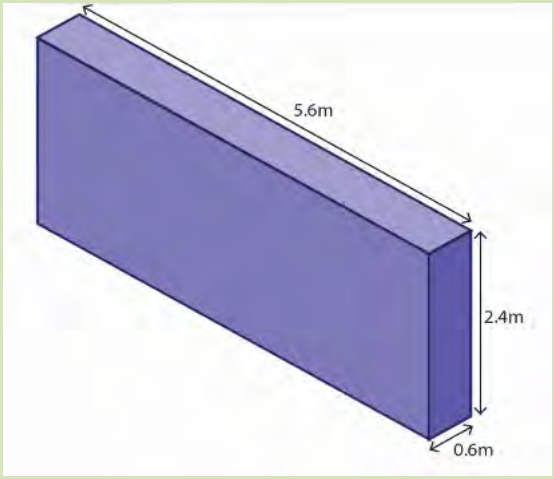


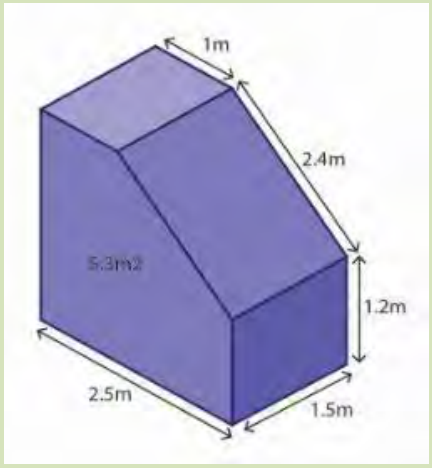
(Maroochydore)
Storage above car bonnets should not be the only storage provided for occupants.

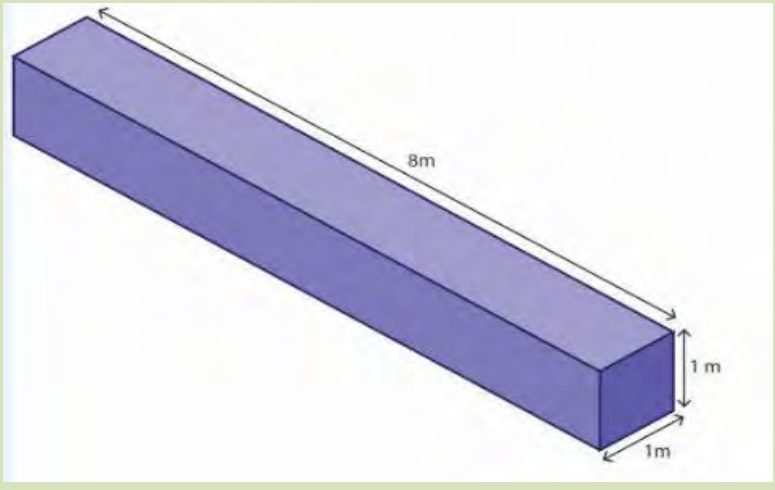
Examples of how 8 cubic metres of storage can be provided.

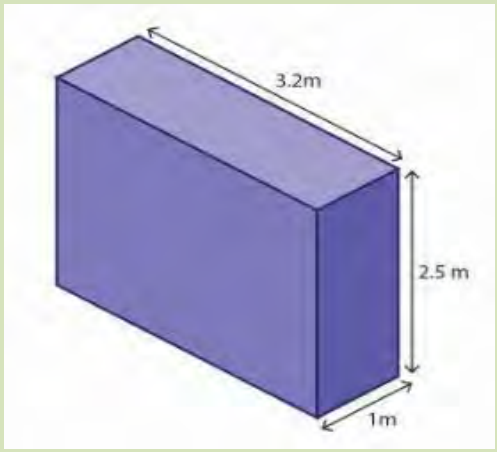










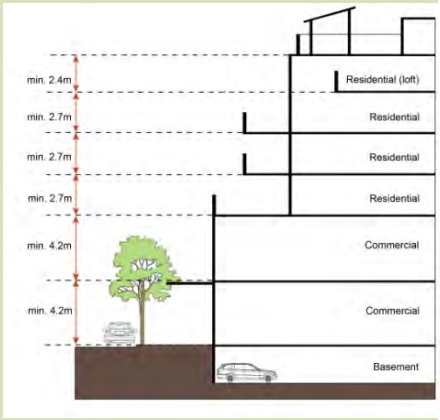


Possible locations for storage include:

a) Cavity under staircases
b) Cupboard/shelving space at end or side of garage/parking space.
c) Shed/Lawn Lockers in private open space areas
d) (Note: does not count towards minimum POS area).
e) Additional cupboard/storage space within unit
f) (Note: excludes wardrobes, laundry cupboards, kitchen cupboards, etc).
g) Private storage lockers/rooms in basement or on ground floor of multi-storey unit developments.

7.15 Adaptable development

Land within or in proximity to a centre and public transport node is efficiently used to capitalise on the activity generated by the centre and transport not for retail and commercial purposes and to contribute to the character and activity of the area.



(Chermside)

(Maroochydore)
Awnings and street furniture can be added once the ground floor is converted to a non-residential use.

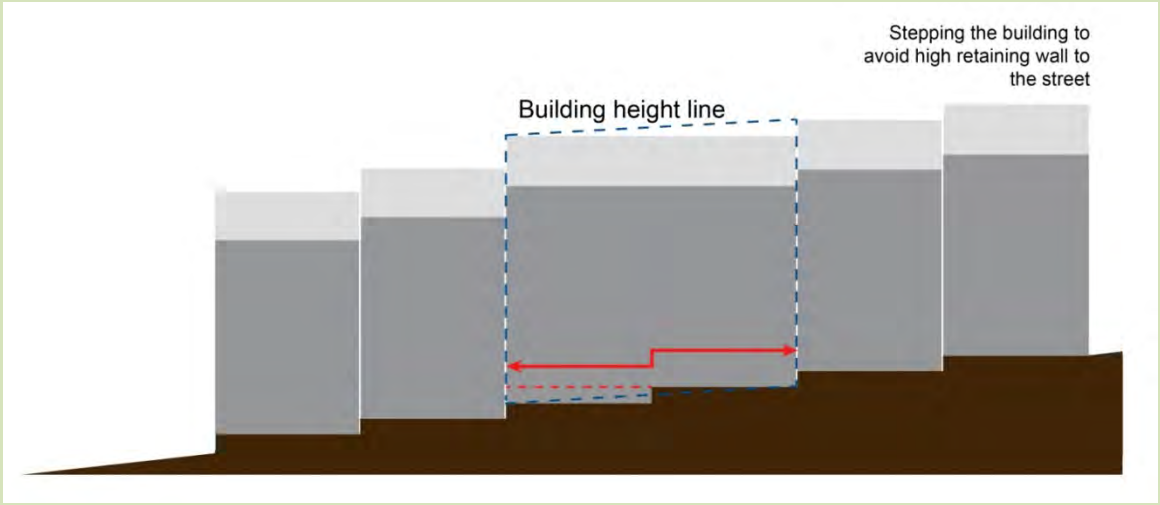
(Caloundra)

(Maroochydore)
Separate entrance for residential uses should be provided in mixed use buildings.

(Maroochydore)
Mixed use buildings should open out onto public spaces e.g. streets, open space or plazas etc.

7.16 Sloping land

The development of sloping sites should avoid cutting and filling as it destroys the local ecology and reduces opportunities for natural ventilation. Development should utilise alternative dwelling types (e.g. terrace housing) and step the building to respond to a sites topography rather than excessive cutting and filling.



Buildings with sloping frontages should be stepped to avoid high retaining walls.

(North Lakes)
Stepped terrace housing

(Narangba)

(Narangba)

7.17 Laneway development

Development adjoining a laneway should be designed to ensure good levels of passive surveillance into, along and through lanes and a reasonable level of amenity and landscaping. Where front door access to a loft apartment is via the laneway, building design should also considered passive surveillance, amenity and landscaping, easy access to visitor car parking accommodation on surrounding streets, pavement treatments, lighting and adequate sight lines for vehicles and pedestrian.

(Maroochydore)

- All vehicle access is to be via the laneway.
- Deep laneway lots are able to accommodate additional tandem car parking.

(Maroochydore)
Screened garbage bin storage areas with fencing and gates to reduce the dominance of garbage bins on the lane.

(Fitzgibbon)
If a dwelling only has frontage to a lane it should address the lane.

(Fitzgibbon)
Landscaping is maximised within the lane to break up the dominance of garages and delineate boundaries between lots.

(Fitzgibbon)
Front - adjoining park

(Fitzgibbon)
Rear – adjoining lane

(Fitzgibbon)
Front - adjoining street

(Maroochydore)
Front – adjoining park

(Maroochydore)
Rear – adjoining lane
Fencing to a lane can be 1.8m high and 0% transparent to screen private open space and servicing areas.

(Maroochydore)
Front – adjoining park
Dwellings should face the non-laneway frontage

(Maroochydore)
Rear – adjoining lane
Lanes should reduce areas for concealment.

(Fitzgibbon)
Front – adjoining park and street beyond

(Fitzgibbon)
Rear – adjoining lane
Fencing providing privacy to private open space

7.18 Visual Impact Assessment

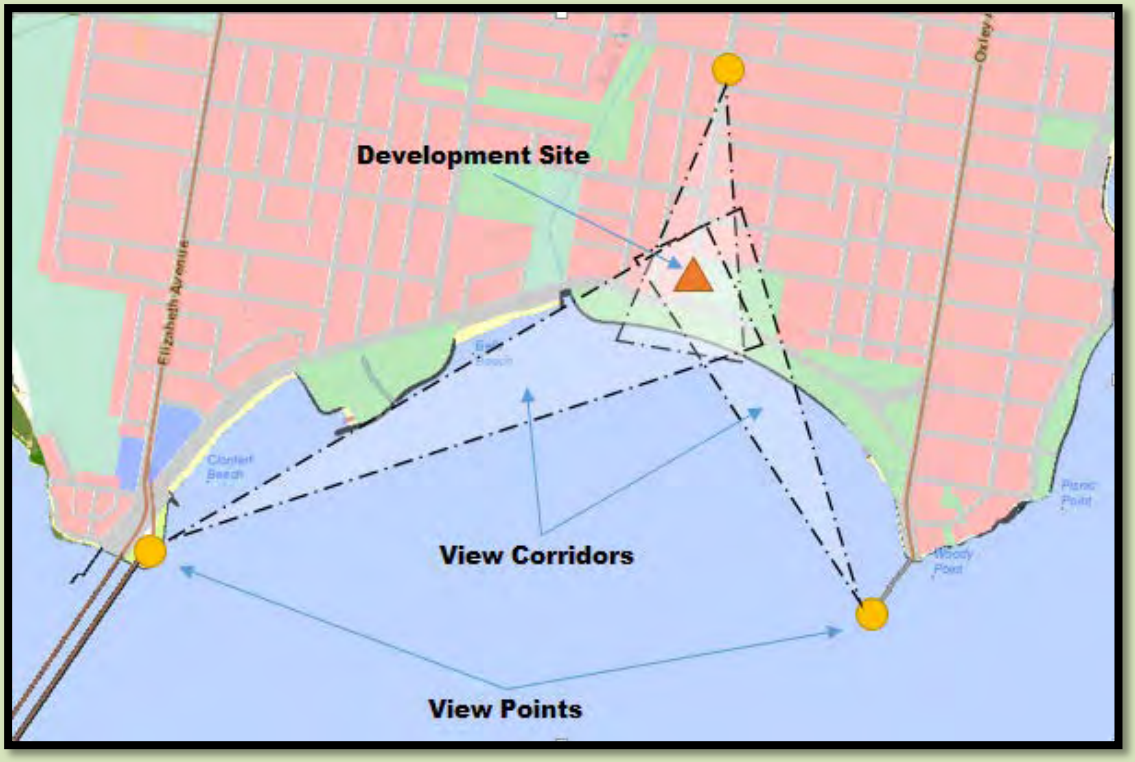
A visual impact assessment may be required where a development proposal departs from the criteria set by the planning scheme, in particular with regards to the maximum building heights, and addresses the potential for impact on the natural landscape and existing built form of the area in which the developed is proposed.

A Visual impact assessment requires the consideration of all built form matters (e.g. height, setbacks, site cover, building bulk and mass, articulation, roof form and other design aspects) from a variety of perspectives (or Public View points) to ascertain if a proposal will result in a positive contribution. Depending on the type of proposal and likely impacts, consideration from view points within private property may also be required.

View points include prominent publicly accessible locations (such as roads, parks, beaches, lookouts, etc.), and are to be selected where the view corridors from that view point will include the proposed development. View points must include approaching views of the proposed development from all directions along the relevant street and active transport network as a minimum. View point photos or rendered perspectives are to be taken from eye height to represent a human perspective from the selected view point.

The visual impact assessment must address the following matters where relevant:

a) Description of the visual components of a proposal.
b) Identification of the limitations and assumptions of the assessment.
c) Review and evaluation of existing natural environment (i.e. landform, vegetation) and built environment (i.e. land uses and other built form components such as structures, signage, bridges).
d) Identification and discussion of sensitive receptors within the surrounding area, and selection of view points. The use of Geographical Information System datasets (i.e. contours, lidar, zone/precinct and overlay mapping, aerial photography and on-site verification / photographs of view corridors) is to be included to justify the appropriateness of the selected View points and View corridors. For larger developments 3d rendered digital graphics files may be requested that can be uploaded into councils GIS software for interrogation.
    a. File formats accepted include Sketchup (.skp), Collada (.dae), and OBJ files (.obj)
e) Discussion and assessment of how the proposal is designed with respect to setbacks, site cover, building bulk and mass, articulation, roof form and other design aspects, to offset and mitigate the possible impacts of the proposed height.
f) Assessment of the impact on visual amenity and character within the view corridors from public view points in the wider area, as well as from the street and adjoining land, a result of the proposed development. The assessment is to consider both the existing character/land uses and building heights, possible future development in accordance with the outcomes for the precinct and zone, as well as the height/bulk and screening qualities of topography and significant vegetation both on and external to the site. Refer to figures below for examples of public view points selected from wider area, street and adjoining land.



Example of possible view points and corridors from wider local area. (above)

Example of possible view points from street and adjoining properties.

8. References and resources

Council of Mayors (SEQ) Revision 2- May 2012, *Medium Density House, Model Planning Scheme code*, Queensland.

Moreland City Council DRAFT 3 October 2012, *Moreland Higher Density Design Code*, Victoria.

Brisbane City Council and the Queensland Government August 2011, *Residential Form Handbook*, Queensland.

WA Government and WA Planning Commission August 2013, *R-Codes State Planning Policy 3.1 Residential Design Codes*, Western Australia.

Landcom August 2009, Housing diversity guide, Working draft for discussion.

Landcom May 2011, *Residential Density guide,* http://www.landcom.com.au/news/publications-and-programs/residential-density-guide.aspx.

ULDA, March 2010, *Residential 30*, Queensland.

Council of Mayors (SEQ) 2011, *Next Generation Planning*, Queensland.

DSDIP
http://eisdocs.dsdip.qld.gov.au/Port%20of%20Gladstone%20Western%20Basin%20Dredging/EIS/appendix-x-scope-and-methoodology-for-visual-impact-assessment.pdf

Banyule City Council, January 2011, Tree planting Zone Guidelines, http://www.google.com.au/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&ved=0ahUKEwi51fOOwvXPAhXPQpQKHYvZCiEQFgghMAE&url=http%3A%2F%2Fwww.banyule.vic.gov.au%2Ffiles%2F62a74319-97db-411e-bb78-a20c00f86a06%2FTree-Planting-Zone-Guidelines.pdf&usg=AFQjCNGy7jWoOhWzY1bXb6JvB0qbsLPpmg

Planning Scheme Policy
Stormwater Management

For State Approval - Major Amendment 1 - December 2017

Table of amendments

Date of adoption and effective date	Planning scheme policy version number	Amendment type	Summary of amendments

Planning scheme policy – Stormwater management

Adoption

Moreton Bay Regional Council adopted this planning scheme policy on 24 November 2015.

Commencement

This planning scheme policy will take effect from 1 February 2016. Amendments to this planning scheme are included at **Table of Amendments** (inside front cover)

1. Introduction

This policy supports the Moreton Bay Regional Council Planning Scheme and has been made by Council in accordance with Chapter 3, Part 4, Division 2 and Part 5, Division 1 of the *Sustainable Planning Act 2009*.

1.1 Purpose

The purpose of this planning scheme policy is to provide guidance for the preparation of a Stormwater Management Plan that addresses stormwater quantity and quality.

1.2 Application

This planning scheme policy applies to assessable development where subject to Stormwater assessment criteria.

1.3 Interpretation

Terms used in this planning scheme policy are defined in Schedule 1 – Definitions of the planning scheme. Where a term is not defined in Schedule 1, section 1.3 Interpretation of the planning scheme applies.

2. Site Based Stormwater Management Plan

A Site Based Stormwater Management Plan (SBSMP) is a broad outline for planning, design, management and maintenance of stormwater **quantity and quality** management measures during construction, 'on' and 'off' maintenance and operational phases of a development.

A SBSMP is to be used as a standalone manual for site managers, engineers, landscape professionals and others conducting detailed design. A SBSMP may form part of an Environmental Management Plan for the development. Where a development is required to submit another management plan such as an Acid Sulphate Soils Management Plan or an Ecological Assessment Report these should be submitted together.

Site Based Stormwater Management Plan requirements

A Site Based Stormwater Management Plan is to be prepared by a suitably qualified individual such as a Civil Engineer or an Environmental Professional and is to be certified by a Registered Professional Engineer (RPEQ) (Civil or Environmental). Such a plan may be required as a result of development being assessed against assessment criteria relating to stormwater quantity and quality management.

2.1 Computer Modelling

The use of computer models is common place and expected during the planning and design of a stormwater management system. Good modelling practice is required to ensure accurate and reliable outcomes. Modellers must understand the limits and sensitivities of their models and the accuracy of the predicted outcomes. Models must be acknowledged as a coarse simplification of complex processes with their accuracy limited by terrain data and uncertainty in key parameters that can vary such as rainfall, roughness and blockage. Models must be calibrated or validated against a number of varying storms where data is available to provide confidence in the results. Although absolute flows and water levels can be subject to varying degrees of uncertainty, the difference or afflux between the model

outputs for the before and after development scenarios is expected to be reasonably accurate as any assumptions or inaccuracies will be present in both scenarios.

A Site Based Stormwater Management Plan will need to include the following details with regards to the computer modelling undertaken:

a) modelling software utilised, including the version/revision number;
b) design/data inputs, including their source;
c) modelling methodology;
d) modelling parameters, assumptions and limitations;
e) results of any sensitivity testing of key parameters;
f) calibration/verification results;
g) model modifications undertaken if using Council's model packages (refer to Section 1.12.3);
h) quality checks including model log and error reporting (message and check) files,
i) results including relevant mapping
j) interpretation and recommendations

Council is to receive the final models with all associated input data files and results. A model log describing the relevant model names, scenarios and key differences is to be included with the model.

Additional guidance on best practice computer modelling can be referenced in Australian Rainfall and Runoff (AR&R) and Australian Runoff Quality (ARQ).

Council has internal modelling expertise and prefers the use of runoff routing and hydraulic models as described below. Alternative models will be considered but it is recommended to receive Council's acceptance of the use of these alternative models prior to their adoption.

2.1.1 Hydrological modelling

Hydrological modelling is used to predict peak flow rates, flow volumes and hydrograph shapes for varying storm events and durations. Models can be based on individual rainfall events or continuous, long term simulations. Continuous models are usually used for assessing the impact to the hydrological cycle. Individual rainfall event simulations are typically used for the design of major stormwater systems. Dynamic or unsteady modelling is required to assess peak flow and storm volumes to understand the impact of changing floodplain storage and the time for flows to peak.

Hydrological modelling is to be completed based on the recommendations provided in AR&R.

Council's preferred hydrologic model is the Watershed Bounded Network Model (WBNM) developed by Michael Boyd, Ted Rigby & Rudi van Drive.

2.1.2 Hydraulic modelling

Hydraulic models are used to determine the area of inundation, flood level and flow velocity to assist with identifying flood hazards. Models can be either one dimensional with a defined flow path (either a pipe or surface/overland flow), two dimensional with an undefined flow path, or a combined one/two dimensional model. Specialist three dimensional models may be applicable for complex hydraulic structures or water quality modelling.

It is recommended that all hydraulic modelling should be undertaken in accordance with the Regional Floodplain Database methodology. Relevant reports describing this methodology are downloadable from Council's website.

The DFE for Flood comprises the upper envelope of a number of storm/catchment scenarios as follows:

a) 1% AEP flood event using ARR design rainfalls

b) 1% Moreton Bay Design Storm (MDS) event which is a 15 minute in 270 minute embedded design storm (15min burst inside a 270 minute burst with storm 'wings' scaled down to preserve overall volume of an ARR design burst)
c) 1% MDS event with Moderate structure blockage – refer to report *Regional Floodplain Database - Floodplain Parameterisation* (SKM, 2012) report downloadable from the Council website.
d) 1% MDS event with 20% Increase in rainfall
e) 1% MDS event with 20% Increase in rainfall and increased downstream boundary (0.8m sea level rise for coastal models and 0.02% AEP event for inland models)
f) 1% MDS event with Medium Dense Vegetation changed to High Dense Vegetation and Low grass/grazing changed to Medium Dense Vegetation within the 1% AEP floodplain to reflect future revegetation.
g) 1% MDS event with Medium Dense Vegetation changed to High Dense Vegetation and Low grass/grazing changed to Medium Dense Vegetation within the 1% AEP floodplain and impact of increased residential development (Change in minor catchment fraction impervious) (this applies only to selected minor basins where urban development is a feature).

Council's preferred hydraulic model is TUFLOW developed by Bill Syme. However in some cases alternate software may be justified depending on the nature of the hydraulic behaviour being assessed. The model complexity must match the complexity of the floodplain and catchment.

2.1.3 Regional Floodplain Database Model Packages

Council's Regional Floodplain Database model library includes fourteen coupled hydrologic and hydraulic models, one for each of the fourteen 'minor basins' within the Moreton Bay Regional Council area. These model packages are available for purchase and can be requested online via Council's Flood Check website https://www.moretonbay.qld.gov.au/floodcheck/

The following is provided when purchasing a model package for a chosen minor basin:

Hydrologic model - WBNM.
a) GIS files - Minor Catchments, Stream Reaches and Stream Junctions
b) Model run files
c) Model result files
    i. 14 ARI's for 10 storm durations;
    ii. 3 Moreton Bay Design Storm (MDS) simulations.

Hydraulic model - TUFLOW.
a) GIS Files - MapInfo MID/MIF input files
b) Model input files, run files
c) Model results files
    i. 14 ARI's for 3-4 durations (varies depending on the minor basin)
    ii. 10 scenarios using the MDS (including DFE scenarios)
d) Result file formats
    i. flt max grids for h, d, V, Z0, ZQRA, ZMBRC (Flood modelling) and Z9 (Storm Tide modelling)
    ii. xmdf - Time series data for h, d, V, q, SP, Z0, ZQRA, ZMBRC (Flood modelling), Z9 (Storm Tide modelling) and any standard TUFLOW outputs
    iii. WRB - WaterRIDE file containing information regarding DEM, velocity and water level
e) Landuse input files based on 2013 Aerial photography
f) Latest LiDAR (2014) (within the model code boundary) as well as modifiers for post LiDAR developments where applicable and available. One or more of the following formats can be used for the modifiers: txt, 12da, asc, MID/MIF, grd and tin.

MBRC does not provide models for the estimation of Overland Flow.

2.1.4 Water Quality Modelling

Site Based Stormwater Management Plans and development applications are to be assessed to meet the operational pollutant reduction targets of the State Planning Policy and Schedule 10 of the MBRC Planning Scheme using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC). The models must be developed in accordance with the Water by Design MUSIC Modelling Guidelines.

There are numerous modelling platforms for detailed catchment and in-stream water quality assessment and sediment transfer. Adoption and appropriate design methodologies are to be discussed with Council prior to undertaking detailed in-stream analysis.

2.1.5 Other models

Council may require as part of development conditions the modelling and assessment of other natural processes such as coastal erosion, groundwater and tidal dynamics. Computer models for these purposes shall be verified by an appropriately qualified expert as suitable for the intended application. Discussion with Council prior to selecting a modelling package is encouraged.

2.2 Stormwater Quantity

The following information is to be provided in a Site Based Stormwater Management Plan or in a Downstream Drainage Discharge Report to assist in the assessment process for all developments regarding stormwater quantity:

2.2.1 Site assessment information

A site analysis and description of the site, surrounds and catchment detailing:

a) existing and proposed land use;
b) topography;
c) catchment area and sub catchments;
d) any site-specific issues;
e) existing stormwater drainage system;
f) major and minor flow paths; and
g) all discharge points from the site and any local flooding issues.

2.2.2 Review of existing information

a) A review of existing waterway/stormwater infrastructure that may be impacted by changes in hydrology, hydraulics;
b) A review of any Catchment or Waterway Management Plans, Stormwater Management Plans or Infrastructure Charges Plans for the area or catchment.
c) Determine/ demonstrate the lawful point/s of stormwater discharge for the development site.
d) Obtain a Flood Check Property Report and Flood Check Development Report from Council's Flood Check website. These reports provide reference information for exiting catchment conditions and the defined flood event levels prior to development on the site.

2.2.3 Potential impacts of the development

a) Investigate the hydraulic and the hydrological characteristics of both the undeveloped and developed scenarios (including the fully developed contributing catchment);
b) Determine whether the development site is likely to subject to flooding and/ or overland flow;
c) Where required, determine drainage impact mitigation requirements to ensure post development discharges do not exceed pre-existing conditions;
d) Demonstrate that the development does not adversely impact on flood behaviours resulting in increased nuisance to upstream or downstream properties;
e) Indicate whether any flood risks associated with the development are fully known, quantifiable and capable of being addressed without any uncertainty.

2.2.4 Stormwater management strategy - Construction Phase

Provide a description of the overall strategy for the management of stormwater quantity for achieving adopted stormwater quantity design objectives during construction phase as defined in PSP Integrated Design.

2.2.5 Stormwater management strategy – Operational Phase

Provide a description of the overall strategy for the management of stormwater quantity for achieving adopted stormwater quantity management design objectives during operational phase as defined in PSP Integrated Design.

The stormwater management plan should identify and detail the following:

a) existing and/or proposed regional stormwater management devices as identified in the regional Stormwater Management Plans or Catchment Management Plans or Infrastructure Charges Plans for the area or catchment;
b) details of the management measures proposed for the implementation;
c) timing of the proposed works in relation to the stage of development.

2.2.6 Computer models

The computer models utilised in the stormwater quantity and flood management strategies will need to be:

a) Generally accepted in the stormwater industry in Australia;
b) Of the latest version.

Electronic copies of the final computer models will need to be provided with all associated input data files and results. A model log describing the relevant model names, scenarios and key differences is also to be included with the model.

Where the proponent chooses to make use of Council's Regional Flood Database (RFD) model, additional requirements and guidance may be provided as part of the licence arrangements.

2.2.7 Figures and plans

Include figures and plans wherever possible, with the minimum requirements including:

a) Existing and proposed catchment, sub-catchments, flow paths and inundation extents and levels where applicable;
b) Conceptual plans and drawings of the location, and the details of stormwater management measures including sizes/volumes and cross sections with dimensions, levels, batter slopes, and boundary clearances, where applicable.
c) Proposed development levels related to AHD

2.3 Stormwater Quality

The following information is to be provided in a Site Based Stormwater Management Plan to assist in the assessment process for all developments regarding stormwater quality:

2.3.1 Site assessment information

A site analysis and description of the site, surrounds and catchment detailing:

a) existing and proposed land use;
b) topography;
c) catchment area;
d) soil type (including dispersive potential and iron content);
e) existing vegetation;
f) any site-specific issues;
g) existing stormwater drainage system;
h) major and minor flow paths; and
i) all discharge points form the site and any local flooding issues.

2.3.2 Review of existing information

a) Description of the receiving environment and review of available water quality data including comparison to identified Environmental Values and receiving Water Quality Objectives.
b) A review of existing downstream waterway/stormwater infrastructure that may be impacted by changes in hydrology, hydraulics or water quality; and
c) A review of any Catchment or Waterway Management Plans, Stormwater Management Plans or Infrastructure Charges Plans, and Council's Total Water Cycle Management Plan for the area or catchment.

2.3.3 Potential impacts of the development

Identify potential impacts that the development may have on stormwater quality, including:

a) assess risks from the impacts of development;
b) estimates pollutant loads from the proposed development;
c) identifies opportunities and constraints analysis based on the findings from Steps a) and b);
d) identification of key pollutants for Construction and Operational Phase;
e) identification of discharge limits based on adopted Water Quality Objectives

2.3.4 Stormwater management strategy

Provide a description of the overall strategy for the management of stormwater and water quality issues, addressing key pollutants and major risks and methods for achieving adopted Water Quality Objectives as defined in PSP Integrated Design.

Additionally, provide a water quality assessment on how on-site water quality satisfies the Development and water quality vision, Development water quality objectives and relevant specific outcomes of the Seqwater Development Guidelines, *Development Guidelines for Water Quality Management in Drinking Water Catchments*.

2.3.5 Construction phase

Identify all details of the proposed erosion and sediment control measures to be provided as part of an erosion and sediment control program for all phases of the development (eg site clearing, bulk earthworks, civil construction and final stabilisation), including:

a) Identification of management issues such as highly dispersive soils, reactive soils, acid sulphate soils, Iron rich and organic rich soils and significant environmental areas on the site to be protected during construction (e.g. wetlands);
b) Erosion and sediment control measures to meet the relevant assessment criteria for achieving adopted design objectives in construction phase as defined in PSP Integrated Design.
c) Monitoring, assessment and reporting provisions;
d) Maintenance schedules including predicted frequency and responsibility for all treatment structures and the overall system during both the construction and operational phases of development;
e) Timing of the proposed works; and
f) A contingency plan if the system or particular structures do not meet the assessment criteria that the indicators have been based on.

These plans could be considered an element of complying with the general environmental duty is accordance with s319 E*nvironmental Protection Act 1994*,

Where development involves a staging plan, the SBSWM is to clearly demonstrate that the proposed staging will facilitate the provision of effective erosion and sediment control during construction of each stage.

Where development involves works which cross waterways or are within the Riparian setback identified on Overlay Map - Riparian Setbacks, the SBSMP must demonstrate how impacts on the waterway have been minimised through appropriate route selection, type of crossing and how construction of the crossing will be managed in accordance with current best practice such as IECA 2008, Best Practice Erosion and Sediment Control - Appendix I.

2.3.6 Operational phase

The following issues are to be addressed for the operational phases of the development:

a) Modelled estimates of the hydraulic and mean annual pollutant loads (and concentrations) of stormwater pre and post development using local rainfall data, including comparisons of both (Model for Urban Stormwater Improvement Conceptualisation (MUSIC) is recommended to model loads).
b) Provision of measures to mitigate hydrologic/hydraulic impacts and their integration with water quality mitigation measures;
c) Selection of treatment devices to achieve the mean annual pollutant load reduction and/or water quality objectives for the identified target pollutants;
d) Specific treatment measures to target iron and organic concentrations where required (iron and organic rich soil and/or discharge to marine or estuarine waterway).

Information should be submitted demonstrating that a range of treatment options have been considered and the optimal treatment train has been selected to achieve maximum pollutant removal effectiveness and minimum maintenance cost to the Council.

If the proposed stormwater network is proposed to discharge into marine or estuarine waterways effective control of iron and organics (Total Organic Carbon) must be specifically demonstrated.

A conceptual design of the proposed stormwater treatment devices should be included. Planning Scheme Policy – Integrated Design should be consulted when applying for the installation of treatment devices. The *Healthy Waterways Water Sensitive Urban Design – Technical Design Guidelines for South East Queensland and other Technical Guidelines by Water by Design* should also be referred to when designing treatment trains.

The plan should identify and detail the following:

a) description of the water quality objectives to be met by the proposed system;
b) details of mean annual loads for specific pollutants and the reduction in load as a result of the proposed treatment train;
c) details of anticipated iron and organic concentrations and the reduction in concentration as a result of the proposed treatment measures (where relevant);
d) specifications of design for each treatment device and a site layout of the treatment train;
e) details of the management measures proposed for the implementation;
f) monitoring, assessment and reporting provisions;
g) maintenance schedules including predicted frequency and responsibility for all treatment structures and the overall system during both the operational and construction phases of the development;
h) cost estimation for maintenance required on stormwater treatment devices including on and off maintenance costs and life cost for the replacement of infrastructure;
i) timing of the proposed works in relation to the stage of development and describe the maintenance regime to be undertaken during ‘on’ and ‘off’ maintenance and the proposed length of both;
j) a contingency plan if the system or particular structures do not meet the water quality objectives that the indicators have been based on; and
k) include an assessment against Healthy Waterways “Living Waterways” criteria.

2.3.7 Computer models

Provide electronic copies of the MUSIC models used in the stormwater quality management strategies; the MUSIC models should be of the latest version.

2.3.8 Figures and plans

Include figures and plans wherever possible, with the minimum requirements including:

a) Existing and proposed catchment and sub-catchments and flow paths;
b) The locations of stormwater treatment and management areas (at appropriate scale for comparison with other development plans);
c) Conceptual plans and drawings of the location, size and type of stormwater treatment measures; and
d) Descriptions and diagrams of the type of treatment measures to be provided.

3 Flood Impact Assessment

A Flood Impact Assessment Report will be required to assist in the assessment process for developments if the development site is located adjacent to a waterway or a waterway is traversing through the site and:

a) The site is likely to be significantly affected by flooding or;
b) The development proposal is likely affect the waterway characteristics including changes to the waterway that may affect the hydraulic capacity and realignment of the waterway.

The Flood Impact Assessment Report is to be prepared and certified by a Registered Professional Engineer of Queensland (RPEQ) with appropriate expertise in flood impact assessments.

The Flood Impact Assessment Report is to document the outcomes of a localised flood investigation, which has been carried out in support of the development. For consideration by the Council, the Flood Impact Assessment Report is to demonstrate that the proposed development of the site, including filling and excavation if included, does not:

a) cause an increase in flooding or drainage risks to surrounding properties or elsewhere on the floodplain;
b) does not impede the flow of floodwaters across the site and/or cause any worsening of flood or coastal hazards (levels, velocities, hazard categories) on neighbouring properties; and
c) does not change the timing of the flood wave or impact on flood warning times.

The scope of the localised flood investigation is to generally accord with the following:

a) investigate the hydraulic characteristics of the waterway for the pre- and post-development scenarios;
b) determine whether the development is likely to cause any adverse impacts to upstream or downstream properties;
c) determine whether the cumulative impact of development is likely to cause an adverse impact on other properties elsewhere in the floodplain;
d) Determine the flood mitigation requirements and demonstrate that they can be implemented through on-site works.

An adverse off-site impact is defined by the following conditions:

a) Flood or Storm Tide levels increase on Department of Transport and Main Roads infrastructure; or
b) Flood or Storm Tide levels increase by more than 0.02m; or
c) Flow velocities increase by more than 0.1m/s; or
d) Any increase to the Flood or Coastal Hazard categories.

Flood and storm tide information on a lot-by-lot basis is available from Council's Flood Check Property and Development Reports. Council has prepared detailed flood models for all fourteen minor basins across the local government area, as well as a storm tide study, which have been integrated into a consolidated Regional Floodplain Database. The localised flood investigation is to utilise appropriate information from Council's Regional Floodplain Database as relevant inputs into this assessment. For larger developments, the use of Council's flood models for assessment purposes is recommended (refer Section 2.4 for further details regarding Council's model packages).

The Flood Impact Assessment Report is to contain, as a minimum, the following:

a) a site survey plan showing drainage easements, waterway corridors, cadastral boundaries, ground levels, structures, trees, fences, kerb and road levels, pipe invert levels and pit surface levels for the existing and proposed conditions;
b) the modelling information detailed in Section 2.1 above;
c) a flood model layout, including ground elevations, adopted surface roughness and structures;
d) a catchment plan showing sub-catchments, flow paths and inundation extents and levels for the existing and proposed conditions;
e) the proposed site layout, including an earthworks plan, the proposed development levels and mitigation measures etc;
f) the model results for flood behaviour (levels, velocities, hazards) including difference plots between existing and proposed conditions across the site and in surrounding properties, for the 5%, 1% and 0.1% Annual Exceedance Probability (AEP) events and the DFE for Flood and Storm Tide, where applicable;

g) discussion and assessment of impacts of flooding on the proposed development;
h) discussion and assessment of the impacts of the proposed development on flooding elsewhere, including confirmation that there are no adverse off-site impacts as a result of the proposed development;
i) a statement of compliance with relevant requirements in the overall outcomes and performance outcomes outlined in the applicable codes.

Where the proponent chooses to make use of Council's Regional Flood Database (RFD) model, additional requirements and guidance may be provided as part of the licence arrangements.