

Part 3 Standards

3.1 Purpose

1. The purpose of this part is to specify the local government's standards that must be met by development for:
 - a. filling and excavation;
 - b. movement network infrastructure;
 - c. stormwater infrastructure;
 - d. water supply infrastructure;
 - e. sewerage infrastructure;
 - f. park infrastructure;
 - g. electricity reticulation infrastructure;
 - h. gas and telecommunication reticulation infrastructure;
 - i. road lighting infrastructure;

3.2 Design and construction of work

3.2.1 Standards and specifications

1. All work is to be in accordance with:
 - a. the standards identified in this planning scheme policy;
 - b. the standard specifications identified in this planning scheme policy;
 - c. the standard drawings identified in this planning scheme policy.
2. If the standards and specifications for the design and construction of specific infrastructure are not provided in this planning scheme policy, guidance may be obtained in reference to the Australian Standards, Queensland Development Code - Mandatory Parts or:
 - a. for transport infrastructure:
 - i. Complete Streets;
 - ii. Austroads publications;
 - iii. Manual for uniform traffic control devices (MUTCD);
 - b. for stormwater infrastructure:
 - i. Queensland Urban Drainage Manual;
 - ii. Australian Rainfall and Runoff;
 - iii. Healthy Waterways Water by Design Guidelines and Standard Drawings;
 - c. for ecological restoration, rehabilitation and revegetation:
 - i. SEQ Ecological Restoration Framework;
 - d. for flood modelling software user manuals and guidelines:
 - i. Floodplain management in Australia: Best practise principles and guidelines (2000);
 - e. for sewerage and water supply:
 - i. South East Queensland - Water Supply and Sewerage Design and Construction Code.

3.2.2 Application of standards

1. Design and construction of work identified in section 3.1 - Purpose of this planning scheme policy shall comply with the standards. Where standards and/or specifications are not stipulated for certain infrastructure elements guidance may be obtained in Part 4: Guidelines of this planning scheme policy.

3.3 Filling and excavation standards

3.3.1 Standards and specifications

3.3.1.1 General

1. A filling and excavation plan and supporting information will be required for assessable development where the development involves filling or excavation which exceeds:
 - a. 20m³ and where earthworks are below the level of the defined flood event and land is wholly or partly within the Flood hazard overlay Map OM-05.00 identified in Schedule 2 - Mapping of the planning scheme;
 - b. 20m³ and in Centre, Community facilities, Low density residential, Low-medium density residential, Medium density residential; Low impact industry, Medium impact industry, Mixed use or Specialised centre zone; or
 - c. 100m³ and in the Emerging community, Environmental management and conservation, Recreation and open space, Rural residential or Rural zone.
2. The filling and excavation plan and supporting information shall provide the necessary information to demonstrate compliance with the Flood hazard overlay code as it relates to filling and excavation.
3. Filling and excavation must comply with the standard specifications in Part 9 - Standard specifications identified in this planning scheme policy.

3.3.1.2 Material used for filling

1. The quality and composition of material used for filling must comply with the following sections of Standard specification No. 1 - Earthworks 2015, identified in Part 9 - Standard specifications of this planning scheme policy:
 - a. section 8.3(1);
 - b. section 9.3(3).

3.3.2 Cover of infrastructure

1. The cover to a water reticulation main is to comply with the South East Queensland Water Supply and Sewerage Design and Construction Code.
2. During construction works:
 - a. no existing hydrant cover or marker post is covered, obstructed or obscured;
 - b. stormwater infrastructure is not pierced.
3. A sewerage reticulation main and a house connection is provided in accordance with the South East Queensland Water Supply and Sewerage Design and Construction Code so that:
 - a. the property can be commanded;
 - b. other services are not fouled;
 - c. stormwater infrastructure is not pierced.

3.3.3 General standards

3.3.3.1 Site disturbance

1. Soil disturbance associated with filling and excavation is limited to the minimum necessary to perform the required filling and excavation.
2. A previously undisturbed area of soil is not exposed to erosion where:
 - a. a slope is greater than 1 in 10; or
 - b. a highly erosive or clay-based soil is present.

3.3.3.2 Site and waste management

1. Waste water from the washing of tools and painting equipment and the cutting of concrete, masonry, tiles or other products is discharged on the site and over a porous grassed surface or well-drained, loosened soil.
2. All waste water generated on the site is:
 - a. prevented from flowing off the site and is allowed to infiltrate the soil; or
 - b. filtered through a porous, fine-grained embankment lined with filter cloth before it is allowed to exit the site.
3. Sand, soil or other material from the site that is deposited on a paved road or within a gutter or a drain is removed:
 - a. immediately, if rain is occurring or is imminent; or
 - b. upon the completion of the day's work, if rain is not occurring or is not imminent.
4. Where sand, soil or other material from the site is deposited on a paved road or within a gutter or a drain as a result of the filling and excavation on the site, the sand, soil or material is:
 - a. first shovelled, then swept from the gutter, drain or paved surface;
 - b. not washed from the surface unless directed by the local government.
5. Solid or liquid waste from a concrete truck and equipment is contained on the site.
6. Cement residue from works associated with filling and excavation, including concreting and the preparation of exposed aggregate concrete surfaces

are:

- a. washed onto a pervious surface such as a grassed or open soil area; or
 - b. contained in a temporary collection trench formed near the concrete surface; or
 - c. filtered through a fine-grained, porous embankment lined with an appropriate filter cloth.
7. An erosion and sediment control measure is kept in working order until:
 - a. the disturbed parts of the site have been effectively stabilised;
 - b. a damaged erosion and sediment control measure is repaired as soon as practicable.
 8. Site signage identifying erosion and sediment control measure and its purpose is installed and maintained.
 9. All solid waste collected in erosion and sediment control measure is disposed at an approved landfill site.

3.3.3.3 Damage

1. No damage will be caused to grass, cultivation, fences, existing services, buildings or stock by fire, falling timber or other causes arising from the filling and excavation.
2. Where damage occurs to fences and areas outside the site, the contractor is responsible for the cost and full reinstatement of those areas.
3. During the clearing of lines and designated areas, care is taken not to disturb any bench marks, survey pegs or level pegs.
4. The relevant service authority is informed when damage occurs to services, or is suspected to have occurred, and the cost of repairs is borne by the contractor.

3.3.3.4 Treatment of adjoining properties

1. Cross-section plans for filling and excavation show the adjoining property boundaries where filling and excavation are adjacent to existing developments.
2. The effect on the drainage of adjoining properties from any cut and fill operation is considered and designed to ensure that no pondage of water or nuisance stormwater runoff occurs.

3.3.3.5 Protection of structures

1. Precautions are taken to ensure that filling and excavation for the construction of an embankment or for an excavation, do not cause movement of, or undue strain to, any structure.

3.3.3.6 Use of explosives and blasting in rock

1. Rock is carefully excavated by blasting procedures where blasting operations comply with the conditions of an approval or licence.
2. The handling, storage and use of explosives complies with the following:
 - a. State Acts;
 - b. AS 2187.1: 1998: Explosives - Storage, transport and use - Storage;
 - c. AS 2187.2: 2006: Explosives - Storage and use - Use of explosives.
3. During blasting operations a vibrograph or other similar instrument is used to observe and record vibrations. The record of vibrations is provided to the local government.
4. Where the record of vibrations indicates non-compliance with the conditions of an approval or licence or the provisions of an Act or Australian Standard:
 - a. the amount of charge is reduced; or
 - b. another action approved by the local government is taken to ensure compliance.
5. Trial blasting may be required to determine the likely vibration that may be caused and the maximum charge to be employed.
6. The local government is to be notified at least three business days prior to any excavation by blasting and any excavation by blasting is only to be carried out at the times identified by the local government.
7. Protective devices are provided to limit the affect of blasting.
8. The contractor is responsible for any loss, damage or injury caused directly or indirectly by blasting.
9. Explosives are kept in secure storage places that are clearly marked with warning signs.
10. No explosive is to be fired until:
 - a. an audible warning, clearly different to other sounds on the site, has been sounded;
 - b. all persons within the radius of danger have been evacuated.
11. Where explosives are used to excavate rock, the amount of charge used does not loosen rock outside the intended excavation lines shown on engineering drawings.
12. Where rock outside excavation lines shown on engineering drawings has been loosened as a result of blasting and may slide or fall, the loosened rock is to be removed and replaced with suitable material.

3.3.3.7 Property pegs

1. Survey pegs or survey marks that identify areas not to be cleared, excavated or covered by embankments, and which are disturbed, displaced, damaged, or covered, are replaced by a licensed surveyor.

3.3.3.8 Environmental weeds

1. Environmental weeds such as declared plants or noxious weeds are identified and managed in accordance with the *Land Protection (Pest and Stock Route Management) Act 2002*.
2. Where earthmoving equipment is moved from an area with environmental weeds to a new site, reasonable measures, including the cleaning of earthmoving equipment and vehicles, are taken to ensure equipment does not transport the environmental weeds.

3.3.3.9 Fire ants

1. In a fire ant restricted area, construction complies with:
 - a. the *Plant Protection Act 1989*;
 - b. any guidelines published by the relevant State Government Department regarding the commercial movement of high risk material.

3.3.3.10 Acid sulfate soils

1. Areas identified as containing acid sulfate soils or potential acid sulfate soils are to be treated in accordance with:
 - a. Acid sulfate soils overlay code in Part 8.2.1 of the planning scheme;
 - b. Queensland Government - Instructions for the Treatment and Management of Acid Sulfate Soils, 2001.

3.3.3.11 Compressive soils

1. Filling and excavation in areas comprising compressive soils that are intended to be developed for an urban use, including roads and parks, achieve consolidation and stability by:
 - a. pre-loading the soil in accordance with the local government's requirements; or
 - b. another method approved by the local government.

3.3.3.12 Dispersive soils

1. Filling, excavation, and construction in areas comprising of dispersive and sodic soils/soils exhibiting dispersive soil characteristics need to be managed so as to not exacerbate the erosive and sedimentation potential.
2. Works should comply with the tenets set out in Best Practice Erosion and Sediment Control Guidelines (2008)(IECA).

3.3.4 Clearing and preservation of trees

3.3.4.1 Clearing

1. Clearing associated with filling and excavation complies with in Part 9 - Standard specifications of this planning scheme policy.
2. Prior to clearing land associated with filling and excavation, the land is inspected by appropriately qualified persons accredited and licensed under the *Queensland Nature Conservation Act, 1992* to conduct and/or supervise the preparation and implementation of Wildlife Protection and Management plans and the detection, capture removal and disposal of wildlife from sites proposed to be developed.

3.3.4.2 Trees to be preserved

1. Filling and excavation is undertaken to preserve without damage, trees and vegetation identified by the local government.
2. Trees and vegetation identified by the local government to be of significance are identified, marked and left standing and undamaged.
3. Trees and vegetation that form part of a riparian or other buffer zone along rivers, creeks or waterways are clearly identified and preserved.
4. The management of trees to be preserved is undertaken in accordance with AS 4970-2009 Protection of Trees on Development Sites.

3.3.5 Dams and embankments

3.3.5.1 Dams

- Embankments, spillways and associated water flow channels are designed and constructed in accordance with the requirements of the Queensland Department of Environment and Heritage and the Queensland Urban Drainage Manual.
- Constructed waterways, embankments and associated outlet structures are not constructed within:
 - ten metres of property boundaries; or
 - 40 metres of a building.
- Maintenance dredging of dams:
 - has regard for water quality requirements;
 - is conducted in a manner that prevents siltation of any downstream watercourse or property.

3.3.5.2 Filling of dams

- Where dams are to be filled, they are dewatered in accordance with best practice, all silt removed and the dam wall levelled to the surrounding ground level. Dewatering of dams should be done in the presence of a spotter catcher.
- To ensure the integrity of drainage lines to and from any dam that is to be filled, an alternative drainage path is designed applying the principle of no worsening in section 3.6.2.10 of this planning scheme policy and utilising best practise natural channel design and erosion and sediment control measures to replace the original drainage path prior to the dam being filled.

3.3.5.3 Organic material

- No tree, log or other organic material is placed in any embankment, scour, hole, dam to be filled or other hollow place where transport infrastructure or allotments are planned.

3.3.6 Batters and retaining walls

3.3.6.1 Batters

- Batters have slopes that are:
 - 1 in 4 for all batters;
 - 1 in 10 for batters in public open space;
 - 1 in 4 for batters to waterways;
 - Rural Roads depth of Cut and Fill:
 - <0.5m - 1 in 6;
 - 0.5m - 1.0m 1 in 4;
 - >1.0 m - 1 in 2.
- Stabilisation by use of vegetation is commenced immediately following completion of bulk filling and excavation to form batters.
- Batters are constructed as follows:
 - wholly within the property boundary;
 - have adequate drainage at the toe and top of the batter.
- All batters and retaining walls within a road resulting from cut and fill operations provide for drainage as specified in the standard drawings in Part 8 - Standard drawings of this planning scheme policy.
- Batters are benched where the proposed freestanding batter height exceeds 2.5 metres.
- Where batters are benched:
 - the minimum benching width is 1.0 metre;
 - the minimum slope is 1 in 100 towards the lower face.
- Precautions are taken to effectively minimise dust that may occur during construction and that may affect the safety or general comfort of the public and occupants of nearby properties.
- Where excavation and filling shall take place near existing or proposed stormwater, water and sewer assets, these assets shall be protected by maintaining the appropriate pipe cover, easement width, CCTV survey and any other protection required by section 3.6.2.16 - Creating new easements; section 3.6.2.17 - Specifications for new easements; section 3.6.2.18 - Works within existing easements and section 3.6.2.19 - Where an easement cannot be obtained of this planning scheme policy.
- Batters are contained so as not to extend into an existing or proposed road, park or conservation area.

3.3.6.2 Retaining walls

- Retaining walls, including boulder walls, concrete gravity retaining walls, reinforced concrete cantilever retaining walls and concrete crib walls, are designed with appropriate provision for sub-soil drainage.
- Timber sleeper walls within an allotment are:
 - used for landscaping purposes only;
 - a maximum of 900mm in height;
 - constructed of timber suitably treated to prevent termite infestation;
 - not constructed within 1.5 metres of the property boundary of private property, public open space or road reserve.
- Treated timber sleeper walls are not located on boundaries of the premises, or where allotments or transport infrastructure are planned.
- A retaining wall:
 - does not encroach onto any adjoining property or road reserve;
 - up to and including 1.5 metres in height, is allowed adjacent to the property boundary provided it has adequate drainage;
 - up to and including 1.5 metres in height, where not adjacent to the property boundary, provides adequate clearance to an adjoining fence for access for weed removal;
 - exceeding 1.5 metres in height, has a minimum boundary clearance equal to the full height of the retaining wall;
 - is designed in accordance with AS 4678: 2002: Earth-retaining structures, Amendment 1 - 2003 and Amendment 2 - 2008;
 - is designed to provide a neat architectural and aesthetic appearance;
 - drains stormwater discharge to the street or other lawful point of discharge;
 - adjacent to road reserve boundary is fenced for pedestrian safety;
 - adjacent to road reserve boundary is fenced with guardrail to deflect vehicles where the retaining wall falls within the clear zone as defined by Austroads. Provide appropriate terminal ends to guardrail;
 - adjacent to road reserve boundary includes safety measures to protect pedestrians in the road reserve during construction;
 - roadside design is in accordance with Austroads Guide to Road and Design.
- For boundary retaining walls for differential allotment levels, a formal submission is made to the local government for approval that demonstrates:
 - compliance with section 3.3.6.1(1) and section 3.3.6.1(3);
 - that the boundary retaining walls (including all associated footings and drainage material) are located entirely within the boundaries of an allotment and do not straddle a boundary.
- Retaining walls do not impose any loading on adjoining structures including underground services. Where the area of influence of the load of a proposed retaining wall influences services, the services or the retaining wall, shall be re-located or re-designed so that the wall is supported and does not have an adverse impact on the service. Retaining walls that influence sewer assets shall submit a build over or near sewer application.
- Retaining walls are not located in a road reserve, however, the local government may consider a retaining wall located in a road reserve upon receipt of a formal submission.
- Retaining walls:
 - within private land and over 1.5 metres in height are stepped a minimum of 1 metre horizontally for every 1.5 metres in height to a maximum height of 3 metres;
 - in public open space areas have a maximum height of 0.6 metres;
 - exceeding 1 metre in height and visible from the road reserve incorporate a high standard of visual appearance through treatments such as:
 - block retaining walls that incorporate variations in coloured and textured masonry bricks to ensure visual interest; or
 - concrete sleeper retaining walls that incorporate a coloured and textured finish; or
 - sandstone or boulder retaining walls.
- Where retaining walls are located within a detention basin, the walls are to be located outside of the inundation area and are to have a maximum height of 1 metre.
- Where retaining walls to waterways are proposed, development provides:
 - riparian buffers, where assessment has shown that riparian buffers are likely to remain sustainable; or
 - structural edge protection, where assessment has shown that riparian buffers are likely to not remain sustainable.
- For retaining walls to waterways:
 - certification of the structural design and stability of the retaining wall is provided by an appropriately qualified and experienced structural engineer in accordance with section 1.7 - Competency to prepare a report of this planning scheme policy;
 - an assessment is conducted as to the likely performance and stability of the retaining wall for a range of possible waterway changes for a 60 year period;
 - no boulder walls to be used in waterways or flood plains;
 - the design must address the following criteria:
 - the top of the wall is generally no lower than the Highest Astronomical Tide plus 200mm;
 - changes to water quality;
 - natural meandering processes;
 - increased boating traffic;

- v. increased tidal volume upstream due to future development;
 - vi. increased flows due to developed catchments;
 - vii. changes in sediment transport availability;
 - viii. maintenance requirements of walls including drainage clean out points to be stated and identified.
12. Upon request, the local government may approve a retaining wall that:
- a. has a minimum clearance from the boundary of the premises equal to the height of the retaining wall;
 - b. is terraced and landscaped;
 - c. does not exceed an angle of repose of 45 degrees to adjoining buildings;
 - d. has a geotechnical and structural design;
 - e. in industrial and commercial areas, has a maximum height of 5 metres;
 - f. in public open space areas, has a maximum height of 0.6 metres;
 - g. has a design life of not less than 60 years.
13. The person who has the benefit of the development approval is responsible for the stability of filling and excavation until final acceptance by the local government of the works off-maintenance.
14. Prior to the acceptance of the works off-maintenance the person who has the benefit of the development approval will replace any section of the filling and excavation that has for any reason become displaced.
15. Temporary drainage is provided to ensure that pondage, flooding, erosion or siltation does not occur on the site, or external to the site, as a result of the filling and excavation.
16. Certification of the retaining wall by a RPEQ (structural) must be submitted to the local government at the time of on maintenance submission.
17. Retaining walls that are adjacent to an existing fence maintain or increase the existing level of privacy for the adjoining premises.
18. Retaining walls that are adjacent to an existing pool fence shall maintain the existing level of pool safety by:
- a. not providing a means of climbing over the pool fence; or
 - b. being fenced to at least the same standard as the pool fence.

Note - concrete crib, grey besser block and grey concrete sleeper retaining walls are not permitted.

3.3.7 Erosion and sediment control (ESC)

3.3.7.1 General

1. Erosion and sediment control is designed in accordance with the International Erosion Control Association (Australasia) Best Practice Erosion & Sediment Control (2008) Guideline and the State Planning Policy Appendix 2 — Stormwater management design objectives, except as modified in this policy.

3.3.7.2 Water quality objectives

1. Controlled discharge water releases must achieve the following:
 - a. 50mg/L Total Suspended Solids (TSS);
 - b. pH in the range 6.5-8.5;
 - c. a turbidity measured in Nephelometric Turbidity Units (NTU) with a maximum of 60 NTU.

3.3.7.3 Qualifications

1. A suitably qualified RPEQ and/or CPESC must have completed an advanced specialised training course in erosion and sediment control provided by a reputable body and be able to provide documentary evidence of such training upon request. IECA's Certified Professional in Erosion and Sediment Control (CPESC) accreditation is accepted as meeting this requirement.

3.3.7.4 Erosion and sediment hazard assessment (ESHA)

1. An Erosion and Sediment Hazard Assessment Form must be completed to determine the degree of risk and to identify the documents required to be submitted to Council as part of an Operational Works application.
2. The erosion and sediment hazard assessment must be undertaken by a suitably qualified and experienced Registered Professional Engineer of Queensland (RPEQ) or Certified Professional in Erosion and Sediment Control (CPESC) if a hazard rating of 'medium' or 'high' is identified.
3. Table 3.3.7.4.1 identifies the required documentation and associated timing depending on the risk identified in the erosion and sediment hazard assessment.

Table 3.3.7.4.1 - Erosion and sediment hazard assessment requirements

ESHA risk level	Required documentation	Timing
ESHA low risk	No erosion and sediment control plan/program is required to be submitted.	With Operational Works application.
	Best practice erosion and sediment control must be implemented. For example, IECA Book 5 - Field Guides.	During construction phase.
ESHA medium risk	A concept Erosion and Sediment Control Plan and Program.	With Operational Works application.
	A detailed Erosion and Sediment Control Plan and Program, an Erosion and Sediment Control Design Certificate prepared and signed by an RPEQ or CPESC.	As conditioned in OW application.
	Erosion and Sediment Control Inspection Certificate signed by an RPEQ or CPESC.	During the construction phase.
ESHA high risk	A concept Erosion and Sediment Control Plan and Program.	With Operational Works application.
	A detailed Erosion and Sediment Control Plan and Program, an Erosion and Sediment Control Design Certificate prepared and signed by an RPEQ and CPESC.	As conditioned in OW application.
	Erosion and Sediment Control Inspection Certificate signed by an RPEQ and CPESC.	During the construction phase.

3.3.7.5 Erosion and sediment control documentation

3.3.7.5.1 General

1. An erosion and sediment control (ESC) plan is required to ensure that downstream receiving waters are not adversely impacted by development. The adequate protection of waterways is undertaken in accordance with the *Environmental Protection Act 1994*.
2. The primary purpose of erosion and sediment control plans is to inform those persons constructing the development what controls need to be implemented through all stages of the development from establishment to completion. Typically, this could require a separate ESC Plan for each phase of the development including:
 - a. site establishment and clearing;
 - b. construction phases (bulk earthworks, civil construction, services installation);
 - c. final stabilisation and the decommissioning of erosion and sediment controls including sediment basin.
3. An erosion and sediment control plan must be prepared and signed by a Registered Professional Engineer of Queensland (RPEQ) and/or Certified Professional in Erosion and Sediment Control (CPESC) depending on erosion and sediment hazard assessment rating.
4. Erosion and sediment control plans/programs are to be submitted to Council a minimum of five days prior to the prestart meeting or works commencing.

3.3.7.5.2 Concept erosion and sediment control plan

1. A concept erosion and sediment control plan must demonstrate the following:
 - a. the design, intensity, configuration and establishment of development is compatible with the physical constraints of the site and receiving environment;
 - b. the feasibility of effective erosion and sediment control measures being implemented is substantiated, throughout construction including consideration of the impacts of the overall development until permanent stabilisation of the site occurs;
 - c. overview strategy for the site outlining the sequence of development, and temporary and permanent management mechanisms, until commissioning of permanent design features (staging summary);
 - d. whether sediment control devices will be located within the future stormwater treatment systems (i.e. bioretention/detention basins and wetlands);
 - e. a contoured site plan(s) showing a conceptual treatment train, the natural features of the site and proposed control structures, including the proposed location and preliminary size of:
 - i. area of disturbance;
 - ii. stockpiling locations;
 - iii. external catchment diversions;
 - iv. sediment basins;
 - v. channels which convey site runoff to sediment basins;

- vi. compensatory erosion and sediment controls for areas which cannot be drained to the sediment basin.
2. Additional information may be required where the constraints, listed in Table 3.3.7.5.2.1, are identified on site.

Table 3.3.7.5.2.1 - Additional information required for addition site constraints

Constraint	Additional information required
Applications involving the endorsement of a staging plan.	Demonstrate that the proposed staging will facilitate effective ESC during the construction and maintenance periods.
Applications involving works within a mapped waterway corridor.	Demonstrate how impacts on the waterway have been minimised through the crossing type and route location selection, and how construction will be staged/managed.
Applications involving an upstream stormwater catchment greater than 1 hectare passing through the site.	Demonstrate that clean stormwater from external catchments can be diverted around or through the site without causing an increase in erosion or mixing with runoff from site works. Alternatively, if external catchment stormwater runoff cannot be diverted around the site, then the ESC Plan and Program must demonstrate there is sufficient land available to construct a sediment basin sized to accommodate the stormwater runoff from the entire up-slope external and site catchments until such time as the up-slope catchments are stabilised against erosion. Ensure there is sufficient land area available to install and operate an appropriately sized sediment basin.
Applications involving 1 hectare or more of soil disturbance.	Demonstrate that there is sufficient land area available to accommodate a sufficiently sized Type A and B sediment basin. Demonstrate that stormwater runoff from all disturbed areas can be conveyed to a sediment basin sized to accommodate the stormwater runoff from the entire up-slope catchments throughout construction until such time as the up-slope catchment is stabilised against erosion. <i>Note: Type D basins are not permitted where land disturbance is greater than 1 hectare.</i>
Applications proposing soil disturbance below 5m AHD.	Demonstrate that stormwater runoff from all disturbed areas can be conveyed to a sediment basin sized to accommodate the stormwater runoff from the entire up-slope catchments throughout construction until such time as the up-slope catchment is stabilised against erosion. Demonstrate that the sediment basin will have sufficient storage volume to contain the design storm event and not be inundated with groundwater and thereby reducing the storage volume required. Ensure there is sufficient land area available to install and operate an appropriately sized sediment basin.
Applications proposing works on land affected by overlay map OM-08.00 Landslide hazard and steep slope area overlay, or on land having a slope greater than 15%.	Demonstrate that there is sufficient land available to construct and operate an appropriately sized sediment basin. Demonstrate that stormwater runoff from all disturbed areas can be conveyed to the sediment basin and include: a. Preliminary scaled engineering sections of the sediment basins showing that they can be practically implemented on the slopes proposed. b. Bulk Earthworks Plan displaying pre and post construction contours and the extents of cut and fill. c. A Steep Slope Assessment geotechnical report signed by a RPEQ suitably qualified in geotechnical engineering to address the proposed works, including ESC measures, in accordance with Planning scheme policy 5 - Infrastructure, Section 2.1.6 Geotechnical reports.

3.3.7.5.3 Detailed erosion and sediment control plan

1. A detailed erosion and sediment control plan must:
 - a. be in accordance with the International Erosion Control Association (Australasia) Best Practice Erosion & Sediment Control (2008);
 - b. at the construction phase, ensure development achieves the applicable stormwater management design objectives in Table A (Appendix 2) of the State Planning Policy (2017), plus in addition to controlled discharge water releases achieving 50mg/L Total Suspended Solids (TS) and pH in the range 6.5-8.5, a turbidity measured in NTUs with a maximum of 60 NTU;
 - c. be based on an assessment of the site's physical constraints and opportunities, including those for soil and landform type, gradient and hydrology;
 - d. be supported with on-site soil testing and the location of problematic soils (e.g. dispersive or acid sulfate soils) and their management for erosion control and sediment control identified (e.g. refer for guidance, IECA BPESC Table 6.3 — Management of problematic soils);
 - e. adopt a convenient scale and include existing and design finished level contours, catchment boundaries, and all proposed erosion and sediment control measures, plus the items listed in Planning scheme policy 5 - Infrastructure, section 2.1.1 General standards for engineering drawings;
 - f. display and notate construction access points, site office, car park and location of material stockpiles, site boundaries, easement boundaries, existing vegetation, existing impervious areas, exiting flow paths, proposed flow paths, subsurface flow paths/patterns, and site stormwater runoff entry and discharge locations;
 - g. locate proposed lots, roads and stormwater drainage systems;
 - h. locate proposed works, and controls (revegetation, cut and fills, the full extent of retaining walls, stormwater runoff diversions, drainage plans, stockpile management, access protection), timing of measures to be implemented, and maintenance requirements (extent and frequency as defined in IECA BPESC 2008, Chapter 6.8);
 - i. show all areas of land disturbance, the way the works will modify the landscape and surface and subsurface drainage patterns (adding new, or modifying existing constraints);
 - j. for each phase of the works (including clearing, earthworks, civil construction, services installation and landscaping), detail the type, location sequence and timing of measures and actions to minimise erosion, manage runoff and capture sediment;
 - k. describe the scheduling of progressive and final rehabilitation of exposed soil areas as civil works progress, including up-slope catchments prior to sediment basin decommissioning;
 - l. identify riparian buffers and areas of vegetation to be protected and fenced off from vehicular traffic;
 - m. display and notate the location, and engineering details, of all necessary sediment basins and erosion and sediment related drainage structures;
 - n. identify the clean and disturbed catchments and flow paths, plus installation sequence for ESC measures showing:
 - i. diversion of clean runoff;
 - ii. diversion of site runoff to sediment controls;
 - iii. sediment fences;
 - iv. collection drains and banks, drainage controls installed above batters, batter chutes and waterway crossings;
 - v. where external catchment runoff cannot be diverted around the site (e.g. at retaining walls), the stabilised 'flow-through' for the single path concentration and conveyance of this runoff through the site;
 - vi. location of discharge outlet points;
 - vii. water quality monitoring areas;
 - viii. short-term flow diversion systems as a response to an impending storm or end-of-day drainage control measures to protect unstable soil from possible overnight rain;
 - o. show calculated flow velocities, flow rates and capacities, drain sizing and scour/lining protection, and velocity/energy checks required for all stormwater diversion and collection drains, banks, chutes and outlets to waterways;
 - p. show waterways (perennial and non-perennial) and details of stabilisation measures for all temporary waterway crossings;
 - q. locate topsoil and/or topsoil stockpiles;
 - r. prescribe non-structural controls such as minimising the extent and duration of soil exposure (to wind, rain and flowing water), staging the works, identifying areas for protection, delaying clearing until construction works are imminent etc.;
 - s. include a maintenance schedule for ensuring ESC and stormwater infrastructure is maintained (i.e. hydraulic capacity and operational effectiveness) in effective working order (refer IECA BPESC 2008, Chapter 6 and Chapter 7);
 - t. include an adaptive management program to identify and rectify non-compliance and deficiencies in environmental performance (refer IECA BPESC 2008, Chapter 6 and Chapter 7), including notification to Council of any non-compliance and the corrective actions to be taken within 24 hours where practicable or as agreed with the construction superintendent and Council inspector.
 - u. include the location of critical environmental values;
 - v. provide details of chemical flocculation proposed, including equipment, chemical dosing rates and procedures, quantities to be stored and storage location, and method of decanting any sediment basin;
 - w. demonstrate how post-construction water sensitive urban design bioretention devices will be adequately protected against sediment ingress during construction activities, including where applicable the transition from construction phase sediment basins to post-construction phase bioretention basins. A sediment basin must not be decommissioned until all up-slope site stabilisation measures have been implemented and are appropriately working to control soil erosion and sediment runoff in accordance with IECA BPESC (2008);
 - x. contain a legend of standard symbols used within the plans;
 - y. clearly state that no land-disturbing activities on the site shall occur until a prestart meeting has been conducted with Council;
 - z. specify the minimum application rates for mulching and revegetation measures and supporting documentation;
 - aa. provide individual ESC plans for the bulk earthworks phase, roadworks and drainage phase, service installation phase and the practical completion/on-maintenance phases of construction. Each phase must be documented graphically on a dedicated ESC plan and be supported by a clearly documented construction sequence and ESC installation sequence which describes the timing of key ESC actions on the site;

- ab. include a technical note on suitable dust control measures consistent with IECA BPESC 2008 (refer, Book 1 Chapter 4 - Design standards and technique selection, Section 4.4.5 Dust control techniques, and Chapter 6 Site management, Section 6.13 Dust control).

3.3.7.5.4 Erosion and sediment control program

1. A construction phase erosion and sediment control program is a set of management strategies, supporting documents and ESC plans that describe what controls are required for all stages of construction, including the conversion and protection of stormwater management infrastructure (e.g. conversion of sediment basins to water sensitive urban design bioretention devices).
2. The applicant of the development application must ensure that a copy of the Development Approval Conditions, Development Permit, Erosion and Sediment Control Plan, Erosion and Sediment Control Program, Monitoring and Maintenance Program, Landscape and/or Site Rehabilitation Plan, and any other documents required for the management of soil erosion and sediment control, are provided to the principal contractor prior to the prestart meeting.

Editor's note - Where there is no documented description of who is responsible, responsibility shall rest with the applicant of the development application.

3. In addition to ESC plans, the ESC program must also:
 - a. be consistent with International Erosion Control Association (Australasia) Best Practice Erosion & Sediment Control (BPESC) 2008;
 - b. be supported by on-site soil testing and NATA accredited laboratory analysis, and appropriate site planning (refer, BPESC Chapter 3 Site planning);
 - c. include contingency measures to ensure ESC measures are always effective, particularly prior to, during and after wet weather;
 - d. document the recommended Operating Procedures for the sediment basins in accordance with the BPESC Appendix B (V2 — June 2018);
 - e. be consistent with the International Erosion Control Association (Australasia) Best Practice Erosion & Sediment Control (2008) taking into consideration all environmental constraints including erosion hazard, season, climate, soil characteristics and proximity to waterways;
 - f. be to a sufficient standard and level of detail to achieve compliance with this policy if the ESC program is correctly implemented on site supported with bulk earthworks plans (detailing cut/fill and retaining wall extents) and stormwater drainage plans;
 - g. include an effective monitoring, assessment and reporting program to identify, measure and report on the effectiveness of the erosion and sediment controls and lawfulness of water releases (refer, BPESC 2008, Chapter 6 and Chapter 7);
 - h. clearly outline the need to adjust or maintain erosion and sediment control and site management practices cognisant of water quality monitoring, sampling and analysis procedures and standards;
 - i. contain a monitoring report to be retained at the site office and made available to Council upon request;
 - j. contain specification and construction detail information for the installation, operation, maintenance and removal of all ESC measures;
 - k. identify procedures for the temporary shutdown of the site (suitable for planned and unplanned shutdowns);
 - l. ensure that it clearly defines and documents who is the 'responsible person/authority' for maintaining those ESC measures that are installed during the construction phase, but which are also required to be operational during the subsequent building phase;
 - m. address the preparation of a revised ESC plan and ESC program, should the development commence but remain uncompleted within twelve (12) months of approval of the Erosion and Sediment Control Plan /Program.

3.3.7.5.5 Alteration to erosion and sediment controls

1. Where the erosion and sediment control plan/program is altered, an updated erosion and sediment control plan (ESC Plan) and erosion and sediment control program (ESC Program) must be submitted to Council.

3.3.7.5.6 Design certificate

1. A completed Erosion and Sediment Control Design Certificate Form must be submitted with any erosion and sediment control plan/program.

3.3.7.5.7 Inspection certificate

1. A completed Erosion and Sediment Control Inspection Certificate Form, must be submitted to Council at all relevant hold points.
2. Inspection certification must be provided to Council within 5 business days of the inspection.

Editor's note - refer to section 3.3.7.6 of this planning scheme policy for hold points.

3.3.7.6 Inspections/hold points and compliance

1. For a 'medium' risk site a suitably qualified and experienced RPEQ or CPESC is to supervise the implementation of erosion and sediment control measures for the site and certify that the requirements of the State Planning Policy 2017 (as amended by this policy for turbidity) and IECA BPESC are achieved.
2. For a 'high' risk site a suitably qualified and experienced RPEQ and CPESC are to supervise the implementation of erosion and sediment control measures for the site and certify that the requirements of the State Planning Policy 2017 (as amended by this policy for turbidity) and IECA BPESC are being achieved.
3. All erosion and sediment control measures are to be installed and inspected in accordance with IECA BPESC 2008 including the following (as a minimum):
 - a. inspect erosion and sediment control measures at least daily when rain is occurring;
 - b. inspect erosion and sediment control measures on a weekly basis (even if work is not occurring on site);
 - c. inspect erosion and sediment control measures within 24 hours prior to expected rainfall;
 - d. inspect erosion and sediment control measures within 18 hours of a rainfall event of sufficient intensity and duration to cause on-site runoff;
 - e. inspect drainage control structures such as diversion banks, diversion channels and temporary culvert protections on a daily basis to ensure they have not been damaged (e.g. by machinery) and are serviceable in readiness for the next rainfall event.
4. For 'medium' and 'high' risk development sites:
 - a. inspection certification must be provided to Council in the form provided in (Appendix C) within 5 business days of the inspection.
 - b. inspection certification must be produced at the nominated hold points below and at any other time in accordance with the conditions of the development approval (refer to IECA BPESC 2008 Chapter 7.8 for discussion on hold points and using inspection and test plans):
 - i. immediately prior to the commencement of bulk earthworks and immediately following completion of bulk earthworks (and on a stage basis);
 - ii. immediately prior to live connection of new stormwater drainage infrastructure works to the existing stormwater/waterway system;
 - iii. immediately prior to any instream works or disturbance within a waterway and immediately following completion of instream works or disturbance within a waterway;
 - iv. immediately prior to (and after) decommissioning of any sediment basin or transitioning from a sediment basin to a water sensitive urban design bioretention device;
 - v. immediately prior to any request for survey plan sealing, on defect or off defect inspection;
 - vi. at intervals not exceeding 1 month.
5. The inspection certificate must be true and accurate assessments of the findings and a copy must be kept on site together with copies of all specific directions issued in relation to the certification.
6. Where inspection indicates a non-conformance, a non-conformance report is to be provided to Council which includes:
 - a. the chain of responsibility;
 - b. details of the nature and cause of non-conformance;
 - c. details of the required corrective actions;
 - d. corrective actions which must be carried out within 24 hours where practicable or as agreed with the construction superintendent and Council inspector.

Note - All inspections are required to be ongoing until the site is fully stabilised.

3.3.7.7 Design considerations

3.3.7.7.1 Erosion control

1. In addition to IECA BPESC Guideline 2008, development is to avoid non-essential exposure of soil and shall:
 - a. restrict the extent of clearing to that necessary for access to, and safe construction of approved works (e.g. refer IECA BPESC Appendix C Soils and revegetation);
 - b. protect vegetation cover in all other areas of the site in accordance with AS4970-2009 - Protection of trees on development sites;
 - c. minimise the duration of soil exposure (to wind, rain, and flowing water) by:
 - i. only clearing vegetation immediately prior to an area being actively worked;
 - ii. stage works to minimise the area of soil exposed at any one time. Soil disturbances must be staged into manageable sized areas of no greater than ten (10) hectares to ensure adequate ESC management and progressive stabilisation of disturbed surfaces;
 - iii. effectively stabilise cleared areas if works are delayed or works are not intended to occur immediately;
 - iv. effectively stabilise areas at finished level without delay and prior to rainfall in accordance with IECA BPESC 2008;
 - v. stabilising steep areas, such as stockpiles, batters and embankments, which are not being actively worked and prior to rainfall in accordance with IECA BPESC 2008.
2. Prior to plan sealing of the survey plan for the development, all site surfaces are to be effectively stabilised using methods that will continue to achieve effective stabilisation in the medium to long term.
3. A site is determined to be effectively stabilised at the time of plan sealing inspection if stabilised methods are:
 - a. consistent with IECA BPESC 2008;
 - b. appropriate for slopes and slope lengths;
 - c. provide a minimum of soil coverage in accordance with IECA BPESC 2008 (refer Table 4.4.7 - Best practice land clearing and rehabilitation requirements);
 - d. have no evidence of erosion, sedimentation or water contamination.

4. Where hydromulch is used as a method of temporary stabilisation, it is important that perennial as well as annual grasses are well established at the time of plan sealing to reduce the risk of instability of the site in the medium to long term. Hydromulch must not be conveyed to waterways.

3.3.7.7.2 Drainage and stormwater control

1. Ensure that all concentrated stormwater flows including drainage lines, diversion drains, channels, spillways and batter chutes are managed onto, through, and at release points from the site in all rain events up to and including the average recurrence interval defined within IECA BPESC 2008 Table 4.3.1 without causing:
- water contamination;
 - sheet, rill or gully erosion;
 - sedimentation;
 - damage to structures or property.
2. In addition to IECA BPESC 2008, design all drainage and stormwater control to:
- ensure clean stormwater which does not require treatment is diverted or managed around the site without increasing the concentration of total suspended solids or other contaminants in the runoff flow and without causing erosion (on or off the site);
 - avoid clean stormwater runoff entering a sediment basin as it will cause an increase in the volumes and frequency of releases from the sediment basin. If it is not feasible to divert all areas discharging clean water around or through the site owing to site constraints (to be demonstrated to Council), then that clean water stormwater runoff is to be managed in the same manner as contaminated water and the sediment basins must be sized to accommodate the additional volume of runoff.
 - divert on-site stormwater runoff from disturbed areas to an appropriately designed sediment basin.
3. All concentrated stormwater flows including drainage lines, diversion drains, channels and batter chutes are managed onto, through and at release points from the site in all rain events up to and including the ARI event of:
- 2-year ARI if the disturbed area is open for less than 12 months;
 - 5-year ARI if the disturbed area is open for between 12 and 24 months;
 - 10-year ARI if the disturbed area is open for more than 24 months.
- Editor's note - For 1. refer, IECA BPESC 2008, Chapter 4, Section 4.3 Drainage control measures.

3.3.7.7.3 Sediment control

1. The design and implementation of best-practice sediment control principles and practice will be in accordance with the monthly rainfall erosivity ratings as set out in the International Erosion Control Association (Australasia) Best Practice Erosion & Sediment Control (2008) Table 4.5.1, unless noted otherwise in this policy.
2. Sediment basins:
- are to be designed in accordance with the Appendix B (IECA BPESC, V2 - June 2018) Sediment basin design and operation, and constructed before any disturbance occurs in the catchment.
 - are to have the capacity to treat flow to best practice standards and are sized in accordance with the revised Appendix B, IECA BPESC, June 2018 (e.g. Step 6a: Sizing Type A basins and Step 6b: Type B basins etc.).
 - provide sediment storage volume in accordance with the Appendix B, IECA BPESC (V2 - June 2018), Table B32; and to capture and treat the runoff for the design rainfall event;
 - are to be dewatered to the appropriate level after each rainfall event no longer than 5 days after a rainfall event;
 - must be provided with suitable all-weather maintenance access.
3. Captured stormwater in sediment basins is to be treated prior to controlled discharge water releases with due regard to forecast rainfall with dewatering releases in accordance with the following limits:
- total suspended solids (maximum 50mg/L, TSS);
 - turbidity (measured in NTUs maximum of 60 NTU);
 - water pH between 6.5 and 8.5 unless otherwise required by Council.
4. During periods of water discharge from the site, water quality samples must be collected at each monitoring station at least once on each calendar day until such discharge stops and the samples are tested by a National Association of Testing Authorities (NATA) accredited laboratory. It is recommended that a site-specific relationship between turbidity and suspended solids is determined for each sediment basin based on a calibrated turbidity metre for use only when further significant rainfall is forecast, rather than waiting for laboratory results. The calibration of the turbidity metre is to be conducted by an appropriately qualified person and a report showing the relationship between TSS and NTU must be provided to Council prior to any water releases occurring.
5. Sediment basins and associated structures such as inlets, outlets and spillways are to be effectively stabilised, structurally sound and in proper working order (refer, IECA Technical Note 7.2 — Proper working order) in accordance with the release limits design storm event within Table B35 (Appendix B, IECA BPESC, V2 - June 2018).
6. Accumulated sediment from basins and other erosion and sediment controls (whether solid or liquid), is disposed of appropriately without causing water or environmental contamination.
7. Emergency spillways on temporary sediment basins are to be designed to convey all rain events up to and including the ARI event of:
- 10-year ARI if the anticipated operation design life is less than three months;
 - 20-year ARI if the anticipated operation design life is between 3 and 12 months;
 - 50-year ARI if the anticipated operation design life is greater than 12 months.
8. Following construction of the sediment basin, scaled 'as constructed' drawings are to be immediately submitted to Council. The 'as constructed' drawing are to be in accordance with the requirements set out in Planning scheme policy 5 - Infrastructure and signed by an RPEQ (and CPESC if the ESHA rating is 'High').
9. For erosion and sediment controls (other than associated with sediment basins):
- implement drainage control measures prior to construction commencing that divert external catchment clean water around the site, or to 'flow-through' measures if diversion is not feasible, to prevent unnecessary contamination of downstream external catchments and reduce the volume of contaminated water to be treated on site;
 - implement drainage control measures prior to construction commencing that divert on-site stormwater runoff from disturbed areas to a sediment basin. Where it is not feasible to divert run-off from small disturbed areas of the site to a sediment basin then implement a full suite of other compensatory drainage and sediment control measures to prevent erosion, while minimising the initial source of soil erosion, particularly raindrop impact erosion and sheet erosion;
 - effectively stabilise all stockpiles, batters and embankments without delay. Where a stockpile is being actively worked, ensure sediment controls are installed and stormwater runoff is managed to ensure erosion of stockpiles, batters or embankments is not caused by concentrated stormwater runoff;
 - ensure sediment does not leave the site on the tyres of vehicles.

Note - Compensatory control measures are erosion controls, drainage controls and sediment controls which compensate for small disturbed areas of the site not being able to divert stormwater runoff to sediment basins and are applied such that the type, timing, placement and management of controls prevent erosion and the potential for water contamination and environmental harm (e.g. turfing or mulching and managing concentrated flows in the area).

Editor's note - For the purpose of this policy, an effectively stabilised surface is defined as one that, as a result of rainfall and stormwater runoff, does not erode, does not cause sedimentation and does not cause water contamination.

3.3.7.7.4 Determining the need for a sediment basin and type

3.3.7.7.4.1 Assess the need for a sediment basin

1. The need for a Type 1 sediment control device (i.e. sediment basin) is to be determined with reference to the IECA BPESC Appendix B (V2 — June 2018), Table B1 — Sediment control standard (default) based on soil loss rate.
- Editor's note - In determining the above, adopt the Appendix E Soil loss estimation (IECA BPESC, 2008) procedures (including the RUSLE equation) for the prediction of long-term average soil loss rates as an 'indicative tool' to determine the sediment control standard in Table B1.
- Editor's note - Council is aware of the limitations listed within Appendix E Soil loss estimation (IECA BPESC, 2008), related to the RUSLE soil loss equation (e.g. addresses sheet and rill erosion for short slopes (< 300 m) and not accounting for erosion caused by concentrated flow etc.) and may for certain drainage catchments require a sediment basin be constructed despite the outcome of Table B1.

3.3.7.7.4.2 Selecting basin type

1. Selection of the type of basin is governed by the parameters and accompanying notes set out in Table 3.3.7.7.4.2.1 - Selection of basin type.
2. Sediment basins are to be designed, operated and maintained in accordance with the steps, recommendations and requirements set out in the IECA BPESC Appendix B (V2 — June 2018).

Table 3.3.7.7.4.2.1 - Selection of basin type

Basin type	Soil and/or catchment condition
Type A	The duration of the soil disturbance, within a given drainage catchment, exceeds 12 months.
Type B	The duration of the soil disturbance, within a given drainage catchment, does not exceed 12 months.
Type D	An alternative to a Type A or B basin when it can be demonstrated that automatic chemical flocculation is not reasonable nor practicable. Note - Type D basins are not permitted where land disturbance is greater than 1ha.

- Notes:
- If more than one soil type exists on the site, then the most stringent criterion applies (i.e. Type A supersedes Type B/D).
 - The duration of soil disturbance shall include only those periods when there is likely to be less than 70% effective ground cover (i.e. C-Factor of 0.05 or higher, refer to Appendix E (IECA BPESC, 2008)).

- #### 3.3.7.7.4.3 Work within waterways

- #### 3.3.7.7.4.4 Soil testing

- ### 3.4 Movement infrastructure standards

3.4.1 Planning guidelines for the movement network

3.4.1.1 Movement network components

1. The movement network comprises the:
 - a. pedestrian network;
 - b. cycle network;
 - c. public transport network;
 - d. road network.
2. Development provides a movement network that is accessible to the whole community and prioritises access and travel in accordance with the following hierarchy:
 - a. walking is the preferred mode of movement;
 - b. cycling is preferable to the use of public transport and private vehicles;
 - c. public transport use is preferable to the use of private vehicles;
 - d. private vehicle use is less preferable than public transport use, walking, and cycling.
3. Development ensures that pedestrian, cycle, public transport and road networks are developed generally in accordance with Table 7.2.1.1 - General planning layouts for areas of this planning scheme policy,

3.4.1.2 Cycle network

1. The cycle network is planned:
 - a. to integrate with and ensure the safety and efficiency of the existing and planned infrastructure for the cycle network identified in Figure 3.4.1.2.1 - Cycle network of this planning scheme policy;
 - b. in accordance with Table 3.4.1.2.1 - Cycle network planning guidelines and section 3.4.3 - Design standards for cycle paths of this planning scheme policy;
 - c. where development is located within 800 metres of a school, to comply with Planning for Safe Transport Infrastructure at Schools prepared by the Department of Transport and Main Roads.

Figure 3.4.1.2.1 - Cycle network

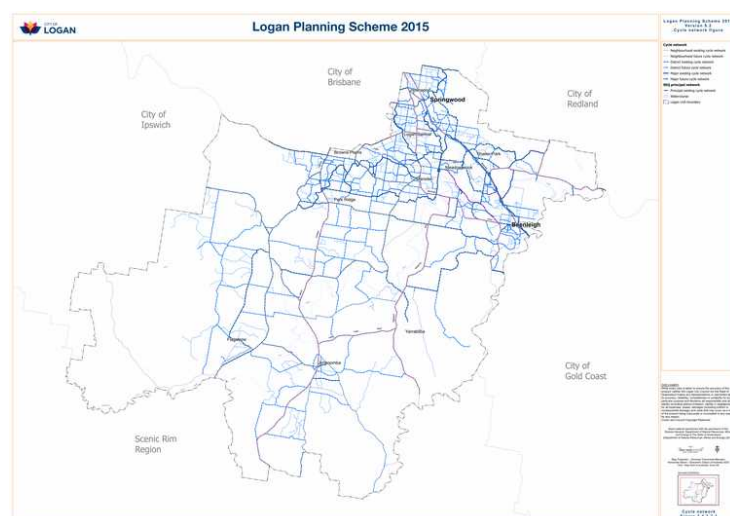


Table 3.4.1.2.1 - Cycle network planning guidelines

Cycle path	Network function	Typical user	Typical location/Types	Operational criteria
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classification					
Neighbourhood route	Connecting residential development with local neighbourhood centres and facilities. Connect to district routes.	School children and other inexperienced cyclists.	Within road shared paths (widened footpaths). On-road cycle lanes are not to be used for neighbourhood routes.	Located on access streets < 3000 vpd, can be route marked as a cycle route, without cycle lanes or paths. Shared verge path. Minimum width: 2m Design speed: 10km/h Local flood immunity: Q1	
District route	Connecting neighbourhood routes to major routes. Serving shopping centres and parks. Connect residential development with district centres and facilities	Higher proportion of inexperienced commuter or recreational cyclists than Major routes. Higher proportion of pedestrians than Major routes.	On-road cycle lanes or shared paths. Shared paths connecting to on-road cycle lanes are supplemented with alternative path for younger cyclists and pedestrians.	Shared verge paths Width: 2.5m Design speed: 20km/h Local flood immunity: Q2	Exclusive paths Width: 2.0m Design speed: 30km/h Local flood immunity: Q2
Major route	Links employment areas and centres and provide access to neighbouring local government areas, road corridor routes or open space corridor routes	Catering for experienced commuter, sporting, or touring cyclists.	Off-road 'exclusive' paths or on-road cycle lanes. (Desired operational outcomes difficult to achieve on with-in road or shared paths.) Shared paths connecting to on-road cycle lanes are supplemented with alternative path for younger cyclists and pedestrians. Alternative on-road cycle lane.	Shared paths	Exclusive paths

3.4.1.3 Public transport network

1. The public transport network is planned:
 - a. to integrate with and ensure the safety and efficiency of the existing and planned infrastructure for the public transport network identified in Figure 3.4.1.3.1 - Public transport network of this planning scheme policy;
 - b. in accordance with Table 3.4.1.3.1 - Desired standard of service for public transport services (Translink) of this planning scheme policy.

Figure 3.4.1.3.1 - Public transport network

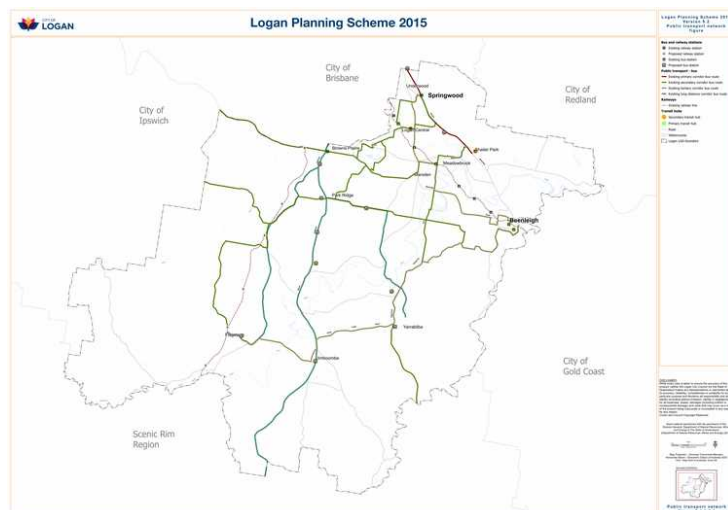


Table 3.4.1.3.1 - Desired standard of service for public transport services (Translink)

Column 1 Density	Column 2 Development type	Column 3 Standard of service
High density (50 dwellings per hectare, 100 residents or jobs per hectare)	Multi-storey (5+) CBD and regional centres (i.e. Brisbane CBD)	High frequency priority (HPF) service - "turn up and go" 15 minute frequency or better
Medium density (20-25 dwellings per hectare, 50 residents or jobs per hectare)	Small lots mixed with apartments	HFP services on major corridors. Infill by local services.
Low density (7-15 dwellings per hectare, 20 residents or 10 jobs per hectare)	Newer subdivisions Business parks	Local services on hourly frequency. Some access to HFP and peak only services.
Non-urban (Fewer than 7 dwellings per hectare, as low as one dwelling per hectare)	Acreage subdivisions Rural towns Isolated villages	Does not generally support public transport services. Inter-regional service may connect to centres. Park 'n' ride to facilitate access to public transport network.

3.4.1.4 Road network

1. The road network is planned:
 - a. to integrate with and ensure the safety and efficiency of the existing and planned infrastructure for road network identified in Figure 3.4.1.4.1 - Road network of this planning scheme policy;
 - b. to comply with Table 3.4.1.4.1 - Road network planning guidelines of this planning scheme policy;
 - c. to comply with the provisions in Queensland Department of Transport and Main Roads Fauna Sensitive Road Design Manual - Volume 2: Preferred Practices;
 - d. in accordance with the desired maximum annual average weekday traffic for a local government road stated in Table 3.4.1.4.2 - Maximum annual average weekday traffic for a local government (mid-block) of this planning scheme policy;
 - e. to ensure that:
 - i. the degree of saturation on any approach for an intersection is not greater than one; or
 - ii. the maximum control delays through intersections in peak periods specified in Table 3.4.1.4.3 - Maximum control delays through intersections in peak periods of this planning scheme policy are not exceeded.
2. All SIDRA modelling used to demonstrate compliance with Council's road network requirements shall be provided to the local government with the development application.

Editor's note - Peak periods are typically from 6am to 9:30am and 3pm to 6:30pm on week days.
Editor's note - The degree of saturation for an approach is the ratio of traffic volume to road capacity.

Figure 3.4.1.4.1 - Road network



Table 3.4.1.4.1 - Road network planning guidelines

Road Function	Location	Road Type	Catchment lots/vpd/Ha	Network Function	Access/Parking Restrictions	Intersections	Operational Criteria	Other Modes
1	2	3	4	5	6	7	8	9
Access	Urban	Urban Access Street (UAS)	<=75 lots	Access streets and roads serve residential, industrial or centres development. They are the destination for most traffic and carry very little 'through' traffic. Access streets will be provided by development. Access roads may serve multiple developments.	There will be no (driveway) access restrictions, although the use of rear laneways to reduce parking on access streets may be desirable	Intersections of Access streets and roads will be typically uncontrolled. Access streets and Access roads intersect with Collector roads typically as roundabouts, but intersections with Arterial roads are avoided.	Access streets should be designed as 'places' with priority for meetings, pedestrians and play. Traffic is slowed to <20kph. Shared space treatments may be desirable. Access roads are <50kph.	Pedestrians and cyclists and service vehicles, but not buses.
		Urban Access Road (UAR)	<=300 lots					
		Urban Neighbourhood Access Road (UNAR)	<=600 lots					
	Non-urban	Rural Access Road (RAR)						
	Centres	Main Street (MS)	2 city blocks					
Collector	Urban	Urban Collector single carriageway (UC-2L)	<=15,000	Collector roads connect access roads to arterial roads. Collectors generally serve one land use and movements contained within the land use should be on Collectors rather than Arterials.	Urban Collector roads typically carry more than 3,000 vpd at speeds up to 60kph. Driveway access is controlled but on-street parking is acceptable. Rear laneways or left-in, left-out arrangements are appropriate. Direct frontage access to rural collectors from large properties may be permitted.	Intersection between Collectors is likely to be roundabouts. Intersections with Arterials are signalised. Intersections are at 300+m spacing	Urban Collectors are speed limited at 60kph. Rural Collectors may have higher speed limits.	On-road cycle lanes are provided on Urban Collectors. Provision for buses using parking lanes.
	Non-urban	Rural Collector (RC)	> 15,000					
	Industrial	Industrial Collector (IC)						
Arterial	Urban	Urban Arterial single carriageway (UA-2L)	<=20,000	Arterial roads have a sub-regional network function crossing land uses.	There will be no parking on, or driveway access to, Urban Arterials. Direct frontage access to Rural Arterials from large properties may be permitted.	Intersections between Arterials are signalised. Intersection spacing is as large as possible and not less than 800m.	Arterials will deliver safe operations at speeds >80kph.	On-road cycle lanes may be provided on the road shoulders, but where the cycle route is part of the cycle network plan, cyclists are on separate, wide paths in the road verge.
		Urban Arterial dual carriageway (UA-4L)	> 20,000					
	Non-urban	Rural Arterial single carriageway (RA-2L)	<=22,000					
		Rural Arterial dual carriageway (RA-4L)	> 22,000					
Multi-modal	On bus routes	Multi-Modal Roads (MMR)		Multi-modal and transit roads serve primary or secondary bus routes.	Parking lanes on Collectors may be converted to transit lanes.	Bus priority treatment at signalised intersections	Transit lanes may be introduced on Collector and Arterial roads.	Transit roads carrying buses, cyclists and pedestrians but not cars may be introduced on Multi-Modal routes.

Table 3.4.1.4.2 - Maximum annual average weekday traffic for a local government (mid-block)

Column 1 Road function	Column 2 Number of lanes	Column 3 Maximum annual average weekday traffic for locality (vehicle per day)		
		Non urban	Urban out-of-centre	Centre
Arterial	2	22,000	20,000	Not applicable
	4	48,000	44,000	Not applicable
Collector	2 (median divided)	Not applicable	15,000	14,000
	4	Not applicable	33,000	30,000

Editor's note - The maximum annual average weekday traffic applies to both multi-modal freight and freight roads.

Table 3.4.1.4.3 - Maximum control delays through intersections in peak periods

Column 1 Location	Column 2 Maximum control delay for type of intersection (seconds)
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	Signal controlled intersection	Roundabout	Sign controlled intersection
Centres and on multi-modal routes	80	70	50
Urban out-of-centre	55	50	35
Non urban and on freight routes	35	35	25

3.4.2 Design standards for footpaths

- Development provides land for a pathway which is not less than 10 metres in width.
- A path, being a footpath or a shared cycle and pedestrian path, constructed within a pathway, is located not less than 1 metre from either side of the pathway.
- A footpath is not less than 1.5 metres in width or 1.2 metres as identified in Table 3.4.4.2.1 - Road design standards.
- A footpath complies with standard drawings IPWEA RS-065, LCC 08-00398 and LCC 08-00399 in Table 8.1.1.1 - Standard drawings for movement infrastructure of Part 8 - Standard drawings of this planning scheme policy.
- Footpaths and paths in a road reserve are in accordance with Table 3.4.4.2.1 - Road design standards of this planning scheme policy.
- A physical barrier to restrict vehicular access to a pathway and to prevent direct pedestrian access to the road at the end of a pathway in accordance with standard drawings LCC 8-00399 in Table 8.1.1.1 - Standard drawings for movement infrastructure of Part 8 - Standard drawings of this planning scheme policy.
- Kerb ramps are provided for the safe passage of pedestrians including provision for people with disabilities.
- A kerb ramp is designed and constructed in accordance with:
 - AS 1428.2: 1992: Design for access and mobility - Enhanced and additional requirements - Buildings and facilities;
 - standard drawings in Table 8.1.1.1 - Standard drawings for movement infrastructure of Part 8 - Standard drawings of this planning scheme policy.
- A pedestrian crossing in a traffic island is designed so that:
 - pedestrian traffic is at the same level as the road pavement;
 - the path through the island allows a person with disabilities to access the intersection or the pedestrian crossing.

3.4.3 Design standards for cycle paths

- Cycle paths comply with the following:
 - the cycle network identified in Figure 3.4.1.2.1 - Cycle network of this planning scheme policy;
 - the design standards for a cycle path identified in Table 3.4.3.1.1 - Cycle path minimum design standards of this planning scheme policy;
 - the Manual of Uniform Traffic Control Devices (Queensland);
 - the standard drawings for cycle paths in Table 8.1.1.1 - Standard drawings for movement infrastructure of Part 8 - Standard drawings of this planning scheme policy.

3.4.3.1 Cycle path geometry

- A pipe and culvert:
 - crossing does not cause a narrowing or perceived narrowing of the width of the approach path;
 - headwall is located a minimum of 1 metre from a cycle path edge.
- A cycle path bridge, pedestrian bridge or boardwalk does not cause a narrowing or perceived narrowing of the width of the approach path.
- A banana rail structure:
 - is provided to create a slow point at the approach to a hazard that cannot be avoided;
 - is provided at an approach to a road crossing;
 - has appropriate signage.

Table 3.4.3.1.1 - Cycle path minimum design standards

Network function	Shared or exclusive cycle path	Minimum design standard			
		Local flood immunity	Design speed (kph)	Minimum curve radius (m)	Minimum width (m)
Major	Shared	10 year ARI	30	25	3.0
	Exclusive	10 year ARI	40	40	2.5
District	Shared	2 year ARI	20	10	2.5
	Exclusive	2 year ARI	30	21	2.0
Neighbourhood	Shared	1 year ARI	10	6	2.5

3.4.3.2 Cycle path gradients

- Where the overall longitudinal grade of a cycle path exceeds 5 percent, it is designed with interspersing short sections of steeper grades with flatter grade recovery sections.
- The maximum length of steep grade on a cycle path complies with Table 3.4.3.2.1 - Maximum length of steep grade of this planning scheme policy.
- Where existing cycle path grades are in excess of 5 percent, the cycle path incorporates measures to minimise the potential for accidents including:
 - avoidance of sharp bends;
 - removal or relocation of fixed obstacles adjacent to the cycle path.

Table 3.4.3.2.1 - Maximum length of steep grade

Grade %	Maximum length (m)
4	150
5	110
6	80
7	60
8	43
9	32

3.4.3.3 Cycle path sight distance

- A cycle path provides sufficient stopping sight distance in accordance with Table 3.4.3.3.1 - Minimum stopping sight distance on a cycle path of this planning scheme policy to allow a cyclist to avoid a hazard on the cycle path.

Table 3.4.3.3.1 - Minimum stopping sight distance on a cycle path

Cyclist speed (kph)	Minimum stopping sight distance on a downhill grade (m)		
	4% downhill grade	6% downhill grade	8% downhill grade
15	15	16	17
30	37	40	43
40	58	61	65

3.4.3.4 Cycle path lateral clearances

- A cycle path provides a minimum clearance of:
 - 0.5 metre aligned parallel to the path of a smooth feature such as a fence with a smooth face;
 - 1 metre to:
 - an obstacle such as a utility pole, sign, tree, rock, park or street furniture;
 - the top of a 'down slope' surface or indent;
 - the base of an 'up slope' surface or indent.
- Where the lateral clearance required in section 3.4.3.4(1) cannot be achieved, a fence barrier:
 - is provided at the side of a cycle path where it is adjacent to a steep batter or change of level including a bridge or boardwalk that:
 - has a minimum height of 1.2 metres;
 - is constructed from materials not likely to cause injury.

3.4.3.5 Cycle path lateral sight distance

1. A cycle path has a minimum lateral clearance in accordance with Table 3.4.3.5.1 - Minimum lateral clearance to provide sight distance on a cycle path of this planning scheme policy to provide a sight distance for a curve in excess of the minimum stopping sight distance.
2. A cycle path has a safe lateral clearance:
 - a. for an on-road path located in the road verge;
 - b. at an approach to an intersection with a path or road;
 - c. at a bend following a straight section;
 - d. at a bridge crossing fitted with a guardrail.
3. A cycle path provides a speed warning sign at a location where the stated sight distance or lateral clearance cannot be achieved.

Table 3.4.3.5.1 - Minimum lateral clearance to provide sight distance on a cycle path

Radius of curve (m)	Minimum lateral clearance (m)		
	30 metres sight distance	40 metres sight distance	60 metres sight distance
30	4	6.5	NA
40	3	5	NA
50	2.5	4	9
60	2	3.3	7.5
70	<2	3	6.5
80		2.5	5.5

3.4.3.6 Lighting of a cycle path

1. A cycle path is lit in accordance with section 5 - Road lighting standards of this planning scheme policy and AS/NZS 1158: 2005 Lighting for roads and public spaces.
2. A cycle path is lit when the minimum usage of the path in any two hour period between:
 - a. dusk and 9pm exceeds 30 users per hour; or
 - b. 9pm and dawn exceeds 20 users per hour.

3.4.3.7 Cycle path signage

1. Cycle path signage is in accordance with:
 - a. AS1742 - 2010 Manual of Uniform Traffic Control Devices;
 - b. Austroads.
2. Way finding signage of a cycle path is:
 - a. consistent with other way finding signage in the area;
 - b. clearly applies only to cyclists.
3. Guide signs for cyclists on a road include:
 - a. bicycle symbol with a white legend on blue background;
 - b. route marker with a white legend on blue background;
 - c. direction sign with a blue legend on white background.
4. A cycle guide sign includes at least one bicycle symbol, the height of which is to be not less than the height of the principal legend.
5. A route marker:
 - a. includes a bicycle symbol, arrow and route letters or numbers unique to the route;
 - b. is provided on all district and major routes;
 - c. is located at:
 - i. a minor road and path intersection;
 - ii. regular intervals between direction signs with a maximum spacing of 1 kilometre.
6. A direction sign:
 - a. provides information about key destinations, including distance, direction and route name;
 - b. is located at a major road and path intersection with the sign position and orientation as far as possible from the line of sight of a motorist.
7. A guide sign in a park:
 - a. may be modified to be consistent with park signage;
 - b. maintains consistency with the form of cycle signs stated in this planning scheme policy.

3.4.3.8 Off road cycle path crossing of a low volume road

1. An off road cycle path crossing a road carrying less than 3,000 vehicles per day:
 - a. provides a cycle wheeling ramp that:
 - i. has a holding rail on the left side of the approach to the road crossing;
 - ii. is offset from the path alignment;
 - iii. has terminal fencing where primary school children are the predominant users of the cycle path crossing;
 - iv. provides good visibility for approaching cyclists;
 - v. ensures that a cyclist is slowed by a sharp curve in the cycle path close to the road crossing.

3.4.3.9 Controlled crossing

1. A controlled crossing for cyclists provides a:
 - a. signalised crossing; or
 - b. zebra pedestrian crossing; or
 - c. school crossing.
2. Cycle symbols are installed on a cycle route at a signalised intersection.
3. The design of a road intersection including a signalised intersection, un-signalised intersection priority treatment and roundabout provides for a cycle path and cycle lane that is in accordance with Austroads Guide to Road Design Part 6A: Pedestrian and Cyclist.

3.4.3.10 Cycle refuge in the median of a divided road

1. A cycle refuge in the median of a divided road:
 - a. is a minimum width of 2 metres between median kerbs;
 - b. is a minimum longitudinal gap of 3 metres;
 - c. provides holding rails on each side of the median gap and on the left side of an approach crossing ramp to allow cyclist to remain mounted within the median;
 - d. provides crossing warning signs and parking restrictions for motorists.

3.4.3.11 Shared cycle and pedestrian path

1. A shared cycle and pedestrian path provides:
 - a. shared path signage in the vicinity of a shopping centre, school or location where older persons may use the path;
 - b. a maximum cross fall of 2 percent.
2. A shared path in the road verge is located closer to the lot boundary where the path is alongside a heavily trafficked or high speed road.
3. A shared path in the road verge is located closer to the road where:
 - a. frequent access paths occur between the path and premises; or
 - b. it is necessary to achieve a better longitudinal profile by locating the path adjacent to the kerb.

3.4.3.12 Cycle path on a major or district cycle route

1. An exclusive or separate cycle path is provided on a major or district route where:
 - a. it is not possible to provide kerb separated contra-flow lanes (Copenhagen lanes) with the road carriageway;
 - b. the projected combined volume of cyclists and pedestrians is such that a shared path would pose a safety risk;
 - c. the geometry of the path allows cyclists to travel safely in excess of 30kph.
2. An exclusive cycle path provides a maximum superelevation of 1 in 15.

3.4.4 Design standards for roads

3.4.4.1 Road safety

1. The safety of all road users is a primary consideration in the standards set out in section 3.4.4.2 - Road design standards of this planning scheme policy.

3.4.4.2 Road design standards

1. A road complies with the following:
 - a. the design standards for a road in Table 3.4.4.2.1 - Road design standards of this planning scheme policy;
 - b. the road network identified in Figure 3.4.1.4.1 - Road network of this planning scheme policy;
 - c. the planning layouts in Table 7.1.1.1 - Planning layouts for road infrastructure in Part 7 - Planning layouts of this planning scheme policy;
 - d. the general planning layouts in Table 7.2.1.1 - General planning layouts for areas in Part 7 - Planning layouts of this planning scheme policy;
 - e. the standard drawings in Table 8.1.1.1 - Standard drawings for movement infrastructure of Part 8 - Standard drawings of this planning scheme policy;
 - f. the standard specifications in Part 9 - Standard specifications of this planning scheme policy;
 - g. the pavement design standards identified in Table 3.4.8.2.1 - Pavement design standards for a road of this planning scheme policy.
2. Where there is inconsistency between the provisions in section 3.4.4.2 - Road design standards and Part 7 - Planning layouts of the planning scheme policy, the provisions of Part 7 - Planning layouts override section 3.4.4.2 - Road design standards of this planning scheme policy.
3. All SIDRA modelling used to demonstrate compliance with Council's road network requirements shall be provided to the local government with the development application.

Table 3.4.4.2.1 - Road design standards

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Road function	Location	Basic road type	Likely signed speed kph	Design speed kph	Maximum grade ⁹ %	Traffic lanes #/m	Parking lanes m	Shoulder or break-down lanes ¹ m	On road cycle lanes m	Bus stop facilities (if needed)	Carriageway width ¹ #/m	Path in one verge m	Path in other verge ⁷ m	Minimum verge width ¹¹ m	Median width m	Minimum reserve width m
Access	Urban ²	Urban access street (UAS)	NA	50	12	2/3.0 unmarked	unmarked				7.5 with 6m sections ¹			4		15.5
		Urban access road (UAR)	NA	60	12	2/3.75 unmarked	unmarked			in indent	7.5	1.2	1.2	4		15.5
		Urban Neighbourhood Access Road (UNAR)	NA	60	12	2/3.5	2.5			in parking lane	12	1.5	1.5	4		20
	Non-urban	Rural access (RA) ¹⁰	70	80	12	2/3.0 unmarked		1			8			6		20
	Industrial	Industrial access (IA)	NA	50	5	2/3.5	2.5			in parking lane	12	1.5	2.5-3	4		20
	Centres ³	Main Street (MS)	40	40	5	2/3.5	6 angled		1.5	in indent	2/11	3-5	3-5	6	6	40
Collector	Urban ⁶	Urban collector single carriageway (UC-2L) ⁴	60	70	6	2/3.5	2.5		1.5	in parking lane	15	1.5	2.5-3	4		23
		Urban collector dual carriageway (UC-4L)	60	70	6	4/3.5	2.5		1.5	in parking lane	2/11	1.5	2.5-3	4	6	36
	Non-urban	Rural collector (RC)	70	80	6	2/3.5		2	on shoulder		11			8		27
	Industrial	Industrial collector (IC)	50	60	5	2/3.5	3		1.5	in parking lane	16	1.5	2.5-3	4		24
Arterial	Urban ⁶	Urban arterial single carriageway (UA-2L)	70	80	6	2/3.5		3	on breakdown	in breakdown	13	1.5	2.5-3	4		21
		Urban arterial dual carriageway (UA-4L)	80	90	6	4/3.5		3	on breakdown	in breakdown	2/10	1.5	2.5-3	4	6	34
	Non-urban	Rural arterial single carriageway (RA-2L)	100	110	6	2/3.5		3	on shoulder	in shoulder	13			8		29
		Rural arterial dual carriageway (RA-4L)	100	110	6	4/3.5		3,1	on shoulder	in shoulder	2/11			8	15	53
Multi-modal ⁵	On bus route	Transit (T)	70	80	5	2/4.5			unmarked		9	1.5	2.5-3	4		17

Note -

1. Shoulders are provided on rural roads without kerb and channel; breakdown lanes are provided on urban roads. Carriageway width includes traffic lanes and on-road cycle lanes and breakdown lanes or shoulders.
2. Other urban access road types may be appropriate. For example, laneways serving rear access or frontage roads acting as service roads between properties and collector or arterial roads.
3. This standard design is for main streets in greenfield developments. There are many possible variations to this design in existing and constrained locations.
4. Control of direct driveway access onto urban collectors is desirable. One possible alternative design for lower volume urban collectors would be a '2-lane divided' road having a median that restricts access to left-in, left-out movements.
5. Multi-modal roads are designed to support primary and secondary bus services. This can be achieved by giving priority to buses at signalised intersections, and/or by the provision of transit lanes on high volume roads. The transit lane must be on a wide (4.5 metre) kerbside lane replacing the 3 metre shoulder. Transit roads are short sections of road for buses, pedestrians and cyclists but not cars or commercial vehicles.
6. Where existing 2 lane collector and arterial roads are severely constrained by development, increased capacity may be achieved by the introduction of 'clearway' operations (ie. banning parking in peak periods).
7. The path in the other verge will generally be a 2.5 metre - 3 metre shared pedestrian and cycle path. Where an exclusive cycle path is required, it may be provided as a 3 metre wide path alongside a footpath identified in Column 13. In either case the verge width must be increased to suite the adopted path widths. Exclusive cycle paths can also be achieved as kerb separated contra-flow lanes in the carriageway (Copenhagen lanes) replacing the on-road cycle lanes.
8. Where an access street or access road abuts a collector or arterial road the 4 metre verge abutting the collector or arterial road may be omitted to restrict direct driveway access.
9. These are desirable maximum grades. Where approved, the adoption of grades steeper than the maximum may be justified for comparatively short sections, difficult terrain or low number of heavy vehicles.
10. The standard design is for forecast Annual Average Daily Traffic (AADT) not exceeding 150 vehicles per day. Alternative designs are required for higher AADT volumes.
11. Verge widths stated are a minimum only and must be widened as required where shared paths 2.5m or greater in width are specified.
12. While an access lane is a type of urban access street, alternate road design requirements are provided in section 3.4.4.3 Access lane.

3.4.4.3 Access lane

1. An access lane:
 - a. provides access to no more than four lots;
 - b. is not located within a cul-de-sac head;
 - c. has a minimum road reserve width of 10 metres;
 - d. has a minimum carriageway width of 6 metres constructed of either:
 - i. minimum 200mm jointed reinforced concrete with SL82 mesh; or
 - ii. a road pavement design to suit an urban access street;
 - e. ensures that sewer and water services are not located beneath the pavement;
2. A reinforced concrete kerbside refuse/recycling bin collection pad is provided adjacent to the entrance to the access lane and is identified on the proposed plan of development.

3.4.4.4 Traveller comfort on a road

1. The vertical alignments and cross-fall changes of a road are designed to minimise motion sickness in vehicle drivers and passengers.
2. When passing from one longitudinal grade to another, the vertical acceleration on a road is less than 0.05g, where g is the acceleration due to gravity.
3. Reverse horizontal curves are not provided unless there is sufficient space between the curves to introduce the full superelevation required for each curve, and without exceeding the standard rate of change of cross-fall for the road design speed in accordance with Austroads.

3.4.4.5 Sight distance of a road

1. The stopping sight distance of a road shall be sufficient to satisfy the design speed of the road specified in Table 3.4.4.2.1 - Road design standards of this planning scheme policy and in accordance with Austroads.

3.4.4.6 Design speed of a road

1. The design speed of a road is in accordance with Table 3.4.4.2.1 - Road design standards of this planning scheme policy.
2. Physical design elements are incorporated for speed control purposes and are preferred ahead of Local Area Traffic Management (LATM) speed control devices. LATM devices should only be proposed where physical design elements cannot achieve appropriate speed control.
3. Where LATM speed control devices are incorporated in road design the LATM speed control devices are constructed to comply with the requirements of:
 - a. Austroads;
 - b. the Manual of Uniform Traffic Control Devices (Queensland).

3.4.4.7 Horizontal alignment of a road

1. The horizontal alignment of a road complies with the road design standards specified in section 3.4.4.2 (Road design standards) of this planning scheme policy.

3.4.4.8 Vertical alignment of a road

1. The vertical alignment of a road complies with the documents specified in section 3.4.4.2 - Road design standards of this planning scheme policy.
2. A vertical curve of parabolic form is provided where the algebraic change on a road exceeds:
 - a. for Access Roads - 1 percent;
 - b. for Collector and Arterial Roads - 0.6 percent.
3. The minimum length of a vertical curve is provided for:
 - a. an Urban Access Road - 20 metres;
 - b. an Urban Collector Road - 35 metres;
 - c. an Urban Arterial Road - 60 metres;
 - d. non-urban roads - as specified by the Road Planning and Design Manual.
4. A vertical curve of a minimum length of 10 metres along a side road is provided where the side road joins a through road at a three way or 'T' intersection, and it is not possible to maintain sight distance to the pavement on the side road.
5. The tangent point of a vertical curve in a side road is to be located at, or outside of, the kerb line of a through road.
6. A vertical curve does not mask the commencement of a horizontal curve.

3.4.4.9 Grade of a road

1. The minimum grade for a road which includes:
 - a. kerb and channel, is 0.6 percent;
 - b. an earth table drain, is 1.0 percent.
2. A table drain with a minimum grade of 1 percent is provided where a road has a grade of less than 1 percent.
3. The maximum grade of a road complies with Table 3.4.4.2.1 - Road design standards of this planning scheme policy.

3.4.4.10 Turning area at the end of a road (cul-de-sac)

1. At the end of proposed and existing roads:
 - a. a vehicle turning area is provided which has a full turning circle with a kerb radii which is:
 - i. a minimum of:
 - A. 20 metres, for the approach curve tangential to the turning circle;
 - B. 9 metres, for the turning circle; or
 - ii. within the outer path for the turning of an HRV complies with AS 2890.2: 2002: Parking facilities - Off-street Commercial Vehicle Parking Facilities; or
 - iii. provides access to an industrial use, a vehicle turning area which has a full turning circle with a kerb radii which is a minimum of:
 - A. 30 metres, for the approach curve tangential to the turning circle;
 - B. 12.5 metres, for the turning circle.
2. Turning heads at the end of a road are:
 - a. circular; or
 - b. with the approval of the local government, "T" shaped; or
 - c. with the approval of the local government, "Y" shaped that:
 - i. provide access to a residential use;
 - ii. incorporate provision for parking.
3. Access to adjoining premises does not conflict with a parking area provided at the end or on the verge of a cul-de-sac.
4. The maximum longitudinal grade at the head of a cul-de-sac is 5 percent.

3.4.4.11 Manoeuvring areas

1. Manoeuvring for refuse collection vehicle is designed so that:
 - a. no more than one reversing movement is required for access to refuse collection points;
 - b. where garbage collection vehicles are required to enter a site, the garbage collection vehicle is able to enter and exit the site in a forward gear.
2. Where development is incomplete (such as a road that ends at a stage boundary) but is to be extended in the future, temporary manoeuvring areas are constructed:
 - a. in the form of a gravel turning area with dimensions in accordance with section 3.4.4.10 - Turning area at the end of a road (cul-de-sac) of this planning scheme policy;
 - b. for a "T" or "Y" turning area that has been approved by the local government, in accordance with section 3.4.4.10(2)(b) and 3.4.4.10(2)(c) of this planning scheme policy.
3. Where a turning area is to be outside the road reserve, an easement in favour of the local government is provided which:
 - a. extends over the full extent of the turning area that is outside the road reserve;
 - b. is for vehicular access purposes and is otherwise on terms satisfactory to the local government.
4. The manoeuvring area has a maximum gradient of 12 percent.
5. The manoeuvring area has a minimum vertical distance of:
 - a. 3.5 metres for a SRV;
 - b. 4.5 metres for a HRV.

3.4.4.12 Cross-section and minimum road reserve

1. Road type cross-sections comply with:
 - a. Table 3.4.4.2.1 - Road design standards of this planning scheme policy;
 - b. Table 3.4.8.2.1 - Pavement design standards for a road;
 - c. the cross section standard drawings in Table 7.1.1.1 - Planning layouts for road infrastructure of this planning scheme policy.

3.4.4.13 Auxiliary lanes of a road

1. An auxiliary turning lane:
 - a. has a minimum width of 3.5 metres;
 - b. is constructed to the same standard as the adjacent road pavement and not less than the standards in Table 3.4.4.2.1 - Road design standards for roads of this planning scheme policy.

3.4.4.14 Carriageway taper of a road

1. A carriageway taper is provided that is constructed to the same standard as the adjacent road pavement and complies with standards of Table 3.4.4.2.1 - Road design standards for roads of this planning scheme policy.

3.4.4.15 Truncation of lot boundaries

1. A lot is truncated so that the lane and verge width is maintained at:
 - a. a speed restriction device;
 - b. a curve;
 - c. an intersection.
2. A truncation to a lot boundary is provided at an intersection to maintain the minimum verge width and minimum sight distance.

3.4.4.16 Threshold and entry treatments

1. Entry and threshold treatments to road surfaces may be used to reinforce the relative traffic importance and priority of streets, at intersections and entries to low speed environments where approved by the local government.
2. Where an entry statement is used on the road surface, the entry statement is:
 - a. stencilled on to the insitu asphalt; or
 - b. painted with an asphaltic paint that is compatible with the underlying material so that cracking does not occur.
3. Entry statements:
 - a. do not compromise public safety or public utilities;
 - b. are basic structures confined to the entrance area only;
 - c. are constructed of low maintenance materials that can be readily maintained and replaced;
 - d. are not located on public land and:
 - i. do not include elements made of wood; or
 - ii. where for character reasons, wood elements are desirable, incorporate alternative materials with a wood-like appearance with superior durability and crash tolerance;
 - e. are located on private land:
 - i. do not include elements made of wood; or
 - ii. where for character reasons, wood elements are desirable, incorporate alternative materials with a wood-like appearance with superior durability and crash tolerance;
 - f. incorporate approved anti-graffiti treatments;
 - g. have mowing strips on all sides for ease of maintenance;
 - h. which incorporate attached individual letters, are designed and constructed so that the letters are securely fastened and difficult to remove.

3.4.5 Design standards for access and driveways

1. Roadwork design, allotment layouts and allotment filling and excavation ensure safe vehicle access to all allotments.
2. Where servicing a development other than a Dual occupancy (auxiliary unit), the design and location of driveway crossovers complies with the following:
 - a. for urban residential driveways, standard drawing IPWEA RS-049 and IPWEA RS-050 in Table 8.1.1.1 - Standard drawings for movement infrastructure of Part 8 - Standard drawings of this planning scheme policy and Guidelines for the Construction of Residential Driveways within Road Reserves fact sheet;
 - b. for non urban residential driveways, standard drawings IPWEA RS-056, LCC 8-00395, LCC 8-00396 and LCC 8-00397 in Table 8.1.1.1 - Standard drawings for movement infrastructure of Part 8 - Standard drawings of this planning scheme policy;
 - c. the approved operational work plans.
3. Where servicing a Dual occupancy (auxiliary unit) located on a lot 600m² in size or greater or located on a corner lot or located on a rear lot, the design and location of driveway crossovers complies with the following:
 - a. for urban residential driveways, standard drawing IPWEA RS-049 and IPWEA RS-050 in Table 8.1.1.1 - Standard drawings for movement infrastructure of Part 8 - Standard drawings of this planning scheme policy and Guidelines for the Construction of Residential Driveways within Road Reserves fact sheet;
 - b. for non urban residential driveways, standard drawings IPWEA RS-056, LCC 8-00395, LCC 8-00396 and LCC 8-00397 in Table 8.1.1.1 - Standard drawings for movement infrastructure of Part 8 - Standard drawings of this planning scheme policy;
 - c. the approved operational work plans.
4. Where servicing a Dual occupancy (auxiliary unit) located on a lot less than 600m² in size or not located on a corner lot or not located on a rear lot, the design of a driveway and driveway crossover complies with the following:
 - a. a driveway is constructed with a width of 5.5 metres for the full extent of the driveway from the kerb invert to the location of the undercover car parking spaces;
 - b. Figure 3.4.5.1.1 - Driveway prohibited locations;
 - c. standard drawing IPWEA RS-050 in Table 8.1.1.1 - Standard drawings for movement infrastructure of Part 8 - Standard drawings of this planning scheme policy (with the exception of references to standard drawing IPWEA RS-049) and Guidelines for the Construction of Residential Driveways within Road Reserves fact sheet;
 - d. the approved operational work plans.
5. Driveway crossovers that incorporate a table drain or pipe culvert are in accordance with standard drawing LCC 8-00395 in Table 8.1.1.1 - Standard drawings for movement infrastructure of Part 8 - Standard drawings of this planning scheme policy.
6. A pipe/box culvert in a driveway crossover has:
 - a. a minimum pipe diameter or dimension of a box culvert that complies with the Queensland Urban Drainage Manual;
 - b. a minimum pipe length of 6 metres on all existing collector roads.
7. Where a reinforced concrete invert crossing is approved by the local government instead of a pipe culvert, it is provided in accordance with standard drawing LCC 8-00396 in Table 8.1.1.1 - Standard drawings for movement infrastructure of Part 8 - Standard drawings of this planning scheme policy.
8. For a partial pipe system with shallow table drains, the driveway crossover is constructed in accordance with standard drawing LCC 8-00397 in Table 8.1.1.1 - Standard drawings for movement infrastructure of Part 8 - Standard drawings of this planning scheme policy.
9. Industrial/commercial driveway crossovers are constructed in accordance with standard drawing IPWEA RS-051 in Table 8.1.1.1 - Standard drawings for movement infrastructure of Part 8 - Standard drawings of this planning scheme policy.
10. A driveway gradient shall be:
 - a. for residential development, preferably maximum 12 percent with an absolute maximum of 16 percent;
 - b. for industrial development, preferably 6 percent with an absolute maximum of 8 percent.
11. The underside vertical clearance of vehicles at crossovers and driveways complies with Appendix C (Ground Clearance Templates) of AS 2890.1: 2004: Parking facilities - Off Street Car Parking.
12. A residential driveway access to rear lots complies with the following criteria:
 - a. Table 3.4.5.1.2 - Design requirements for residential driveway access to rear lots;
 - b. Sealed pavement constructed in accordance with:
 - i. Table 3.4.8.2.1 - Pavement design standards for a road (urban access street); or
 - ii. a reinforced concrete design suitable for the use.
13. Non-urban driveway access to rear lots complies with the following criteria:
 - a. 10 metre wide driveway reserve;
 - b. 3 metre wide sealed pavement constructed in accordance with:
 - i. Table 3.4.8.2.1 - Pavement design standards for a road (rural access road) of the of this planning scheme policy; or
 - ii. an approved reinforced concrete design;
 - c. 2 metre wide minimum offset from property line.

Figure 3.4.5.1.1 - Driveway prohibited locations

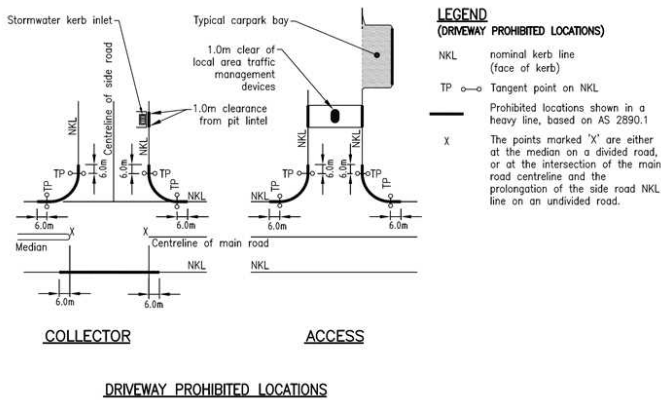


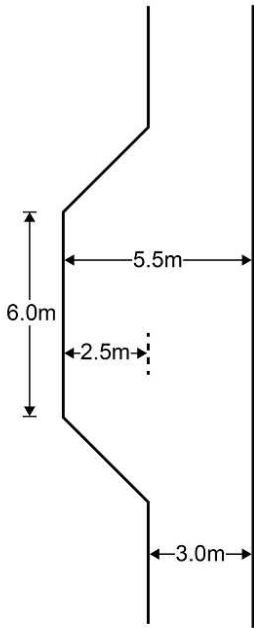
Table 3.4.5.1.2 - Design requirements for residential driveway access to rear lots

Number of dwellings serviced by access driveway	Minimum pavement width	Minimum width of driveway reserve	Passing bays	On-site refuse collection
1	3m	4m	No	No
2	3m	5.5m	Yes ¹	No
3	3m	5.5m	Yes ¹	No
4	3m	5.5m	Yes ¹	Yes ²
5 or more	5.5m	8m	No	Yes ²

Note - ¹ Where a driveway exceeds 30 metres in length one passing bay is to be provided for every 30 metres of length. Passing bays are to be 2.5 metres in width (total driveway width of 5.5 metres) and 6 metres in length with 45 degree tapers provided as identified in Figure 3.4.5.1.3 - Passing bay dimensions.

Note - ² Where on-site refuse collection is required, a 10.3 metre long refuse collection vehicle is permitted a maximum three point turning manoeuvre with sufficient clearance to any obstructions. The vehicle must enter and exit the site in a forward gear. The access driveway (including crossover) is to be designed to withstand heavy vehicles.

Figure 3.4.5.1.3 - Passing bay dimensions



3.4.5.1 Queuing on a road

1. Roads, driveways and car parking aisles have sufficient queuing space to ensure that vehicles do not queue across intersections.

3.4.6 Design standards for car parking

3.4.6.1 General Standard drawings for a parking area

1. Car parking is in accordance with the standard drawings in Table 8.1.2.1 - Standard drawings for a parking area of Part 8 - Standard drawings of this planning scheme policy.

3.4.6.2 Off-street parking facilities

1. Off-street parking facilities and associated access driveways are designed in accordance with:
- a. AS 2890.1: 2004: Parking facilities - Off-street car parking;
 - b. AS 2890.6: Off street parking for people with disabilities;
 - c. AS 2890.2: 2002: Parking facilities - Off-street Commercial Vehicle Parking Facilities;

3.4.6.3 On-street parking facilities

1. On-street parking facilities are designed in accordance with AS 2890.5: 1993: Parking facilities - On Street Parking.
2. All line marking and signage is in accordance with:
 - a. the Australian Standards identified in section 3.4.6.3(1) of this planning scheme policy;
 - b. the Manual of Uniform Traffic Control Devices (Queensland).

3.4.6.4 Bicycle parking

1. Bicycle parking facilities are designed in accordance with AS 2890.3: 1993: Bicycle parking facilities.

3.4.6.5 Manoeuvring

1. Car parks provide a vehicle manoeuvring area for the design vehicles specified in Table 9.4.7.3.5 - Design vehicle for a manoeuvring area in Part 9 - Development codes of the planning scheme:
 - a. In relation to manoeuvring, are designed in accordance with AS 2890.1: 2004: Parking facilities - Off Street Car Parking and AS 2890.2: 2002 Off-street commercial vehicle facilities RV (12.5 metre) template;
 - b. in an industrial area, provide areas which cater for manoeuvring of a B-double vehicle as defined in the Transport Operations (Road Use Management - Vehicle Registration) Regulation 2010, where there is direct access onto a road classified as a B-double route.
2. Manoeuvring for docking bays:
 - a. caters for HRV and semi-trailer access;
 - b. is designed so that no more than one reversing movement is required for access;
 - c. is not located within a car parking aisle.

3.4.6.6 Landscaping

1. Landscaping setbacks from a kerb are as follows:
 - a. paving - to the back of kerb;
 - b. planting - to the back of kerb;
 - c. street furniture - 0.5 metres behind the kerb;
 - d. street trees - 0.6 metres behind a kerb measured from the centre of the tree trunk.
2. Landscaping complies with:
 - a. the standard drawings in Table 8.2.1.1 - Standard drawings for landscaping of Part 8 - Standard drawings of this planning scheme policy;
 - b. the standard specifications in Part 9 - Standard specifications of this planning scheme policy;
 - c. Austroads guidelines where non-frangible landscaping is provided.
3. Shade tree counts and minimum landscaped areas in car parks are calculated as follows:
Shade tree count per car park = Car park area x 25%
shade provided per tree
 - a. where the minimum shade provided by a tree after 5 years growth = $\pi \times \text{radius}^2$ of the tree canopy (drip line)
4. This calculation averages out one 'medium size' shade tree per 2.5 car parking spaces
5. The intention of this calculation is to give flexibility of design by specifying a minimum shade requirement that may be achieved by many small trees or fewer large trees.
6. A minimum 2.25m² of landscaped area is provided around all shade trees, that allows the free circulation of air and water to and from the tree's root system and protection from foot and vehicular traffic.
7. A landscaped area is the area that abuts a parking bay or access aisle and includes the minimum 2.25m² per shade trees, but excludes any areas defined as landscaped buffer strips.
8. A landscaped area of at least 10 percent of the site area is provided.

3.4.6.7 Lighting

1. Car park lighting:
 - a. is provided in accordance with section 4 of AS 2890.1: 2004: Parking facilities - Off-street car parking;
 - b. illuminates:
 - i. an open surface car park to 15 lux;
 - ii. a basement car park to 50 lux;
 - iii. the first 12 metres of the basement access way from a daylight area to a minimum of 200 lux;
 - iv. the first six metres for a basement access way from a daylight area to a minimum of 1,000 lux;
 - v. a pay station, ticket splitter and the like to a minimum of 50 lux.

3.4.6.8 Signage and line marking

1. Signs are setback a minimum of 0.5 metres behind a kerb.
2. Car park signage and line marking is provided in accordance with the Manual of Uniform Traffic Control Devices (Queensland) to identify the location of the car park and the position of an access point for a car park used by the public where:
 - a. the car park is located at the rear of the premises;
 - b. access to the premises is not located on the primary frontage of the premises;
 - c. there are a number of access points serving different parts of the premises.

3.4.6.9 Stormwater

1. If the car park is graded such that stormwater would drain across the verge via a crossover, a grated inlet is provided the full width of the crossover immediately inside the premises;
2. All stormwater collected on a car park is piped to a nominated lawful point of discharge.

3.4.6.10 Road pavement design

1. Car parks to be maintained by the local government have a minimum flexible pavement depth of 250 mm.

3.4.7 Intersection work

3.4.7.1 Geometric standards

1. A four way intersection must provide signalisation or a roundabout at the intersection.
2. An intersection is designed:
 - a. to accommodate the turning path of the largest vehicle that might be expected to traverse the intersection depending on its role in the network;
 - b. with a clearance of not less than 0.3 metres between the outer wheel track and the kerb at all points for the turning path.
3. An intersection is designed and located in accordance with current industry best standard.

3.4.8 Road pavement design

3.4.8.1 Pavement design of a road

1. A road has a:
 - a. 25 year design life for Urban arterial roads, Rural arterial roads, Transit roads, Industrial collector roads and Centres access roads;
 - b. 20 year design life for all other roads.
2. Roads comply with Austroads Pavement Structural Design Part 2, AGPT02-12.
3. A rigid pavement complies with Austroads Pavement Structural Design Part 2, AGPT02-12.

3.4.8.2 Pavement design standards for a road

1. Pavement design standards for a road are in accordance with Table 3.4.8.2.1 - Pavement design standards for a road of this planning scheme policy.
2. Roads designated for mechanistic design in Table 3.4.8.2.1 - Pavement design standards for a road of this planning scheme policy will be designed using mechanistic design process defined in Austroads Pavement Structural Design Part 2, AGPT02-12.
3. Road pavement will be designed to resist subgrade rutting, surface fatigue and cement stabilisation fatigue for the design period.

Table 3.4.8.2.1 - Pavement design standards for a road

Road type	Pavement	Primer type	ESAs ^(a)	Minimum pavement	Minimum AC ^(b) thickness	Quality of material for	Quality of material for
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	surface type		(may be expressed 1xE _n e.g. 4.4xE ₄)	thickness (mm) ^(d)	(mm)	base course pavement (CBR ^(c))	sub-base course pavement (CBR)
Urban access street	AC	Prime	1.1x10 ⁵	250 ^(e)	35mm of 10mm mix	80	45
Urban access road	AC	Prime	5.9x10 ⁵	300 ^(e)	35mm of 10mm mix	80	45
Urban neighbourhood access road	AC	Primer Seal	2.3x10 ⁶	350 ^(e)	50mm of 14mm mix	80	45
Rural access road	AC	Prime	8.3 x10 ⁴	250 ^(e)	35mm of 10mm mix	80	45
Industrial access road	AC	Prime	5.4x10 ⁶	400 ^(f)	50mm of 14mm mix	80	45
Centres access street (main street)	AC	Primer seal	Mechanistic	500 ^(f)	50mm of 14mm mix	80	45
Urban collector	AC	Primer seal	6.4x10 ⁶	400 ^(f)	50mm of 14mm mix	80	45
Rural collector	AC	Prime	5.5x10 ⁵	300 ^(e)	35mm of 10mm mix	80	45
Industrial collector	AC	Primer seal	Mechanistic	500 ^(f)	50mm of 14mm mix	80	45
Urban arterial	AC	Primer seal	Mechanistic	500 ^(f)	50mm of 14mm mix	80	45
Rural arterial	AC	Primer seal	Mechanistic	500 ^(f)	50mm of 14mm mix	80	45
Transit road	AC	Primer seal	Mechanistic	500 ^(f)	50mm of 14mm mix	80	45

- a. ESA means equivalent standard axes.
b. AC means asphaltic concrete.
c. CBR means California bearing ratio.
d. Pavement thickness excludes surfacing.
e. All base must have a minimum surface layer thickness of 150mm and for remaining base and sub-base a minimum 100mm for each layer.
f. Minimum of 300mm of CBR80 material is required before the sub-base can be utilised.

3.4.8.3 Sub-grade of a road

- The design CBR for each sub-grade area is calculated as follows:
 - the least of 4 day soaked CBRs (for less than 5 results on the same material); or
 - the 10th percentile of all 4 day soaked CBRs (for more than 4 results on the same material) = $C - 1.3 \times S$ where:
 - C is the mean of all 4 day soaked CBRs;
 - S is the standard deviation of all values.
- A subgrade that has shrink or swell percentages greater than 2.5 percent is assessed and documented in the pavement design report by the design engineer which shows the potential for subgrade volume changes to reflect through to the road surface
- Where the shrink or swell percentages exceed 5 percent the mitigation measures shall be incorporated in the design and documented.

Note - In cases where the CBR value is less than 3 adopt 3 as the design CBR and add 75mm of CBR 15 material for each 0.5 reduction in the CBR value below 3.

3.4.8.4 Pavement surfacing of a road

- All road surfacing complies with the standard specifications in Part 9-Standard specifications of this planning scheme policy.
- Asphaltic concrete surfacing on all roads is provided in accordance with Part 9-Standard specifications of this planning scheme policy.
- Paving blocks are not provided in a road.
- Stable and safe road surfaces are provided to enhance the safe and efficient use of the road network by providing sufficient:
 - rolling resistance to ensure safe braking;
 - lateral resistance to ensure safe cornering.

3.4.8.5 Road shoulders

- A road shoulder is:
 - in accordance with Table 3.4.4.2.1 - Road design standards of this planning scheme policy;
 - constructed of the same pavement material and to the same depth as the carriageway.

3.4.9 Road drainage

3.4.9.1 Kerb and channel

- A concrete kerb and channel that complies with the standard drawing IPWEA RS-080 in Table 8.1.1.1 - Standard drawings for movement infrastructure of Part 8 - Standard Drawings of this planning scheme policy will be provided on all urban roads.
- For a Non-urban road, kerb and channel is not used.
- The standard kerb and channel for a road is Type M3, in accordance with standard drawing IPWEA RS-080 in Table 8.1.1.1 - Standard drawings for movement infrastructure of Part 8 - Standard Drawings of this planning scheme policy.
- For a road with a one-way crossfall, a Type M6 flush concrete kerb is used on the high side of the pavement in accordance with standard drawing IPWEA RS-080 in Table 8.1.1.1 - Standard drawings for movement infrastructure of Part 8 - Standard Drawings of this planning scheme policy.
- A Type B1 kerb and channel with a 450mm channel is in accordance with standard drawing IPWEA RS-080 in Table 8.1.1.1 - Standard drawings for movement infrastructure of Part 8 - Standard Drawings of this planning scheme policy is provided:
 - on a road adjoining a park;
 - on an Industrial Road, where a heavy duty barrier type is used such as Type B1, with additional 50mm base thickness;
 - on a Major Road;
 - on a Major Urban Collector Road;
 - in a Shopping centre;
 - in a location where high pedestrian volumes are likely.
- A Type SM5 kerb is provided in accordance with standard drawing IPWEA RS-080 in Table 8.1.1.1 - Standard drawings for movement infrastructure of Part 8 - Standard Drawings of this planning scheme policy:
 - at a median and a traffic island;
 - in the centre island on a roundabout.
- The minimum longitudinal grade of a kerb and channel is 0.6 percent.
- Invert crossings are provided at the intersections of urban roads in accordance with standard drawing IPWEA RS-080 in Table 8.1.1.1 - Standard drawings for movement infrastructure of Part 8 - Standard Drawings of this planning scheme policy.
- The grading of a kerb and channel complies with the road centreline grading.

3.4.9.2 Table drains

- Where a kerb and channel is not constructed a table drain is provided which is no deeper than 500mm on both sides of a road.
- A table drain is provided:
 - which remains shallow, by the incorporation of a low flow pipe and an overflow chamber where a deep drain is required to discharge stormwater;
 - on both sides of Non-Urban Roads in accordance with the standard drawings in Part 8 - Standard drawings of this planning scheme policy.
- A table drain:
 - is in accordance with sections 3.4.4.7 - Vertical alignment of a road and 3.4.4.8 - Grade of a road of this planning scheme policy;
 - is constructed with either flat or angled beds;
 - is diverted to a side drain, a cut off drain, a cross-road culvert or a watercourse so that runoff does not pond near the road;
 - is designed to prevent the pondage of runoff in the sub-grade or on the road surface;
 - is turfed for the full width and length of the table drain.
- Where a table drain is provided, sub-surface drainage at the outer edge of the road pavement is also provided in accordance with section 3.4.9 - Road drainage of this planning scheme policy.

3.4.9.3 Crossfall of a road

- A carriageway crossfall complies with the documents listed in section 3.4.4.2 - Road design standards of this planning scheme policy.
- The minimum pavement crossfall for:
 - bitumen sealed roads and shoulders and gravel roads is 3 percent;
 - asphaltic concrete surfacing is 2.5 percent;
 - concrete surfacing is 2.0 percent.
- A pavement crossfall does not exceed 5 percent.
- The crossfall on a grassed median on a divided road has an absolute maximum grade of 25 percent.
- Where minimum cross falls cannot be achieved, the longitudinal grades are used to shed water.
- Minimise the chances of vehicles aquaplaning through the appropriate combinations of cross fall and grade and comply with the requirements of

Austroroads.

3.4.9.4 Sub-surface drainage of a road

- Where required, all sub-surface drainage of a road complies with:
 - standard drawing IPWEA RS-140 and IPWEA RS-142 in Table 8.1.1.1 - Standard drawings for movement infrastructure of Part 8 - Standard Drawings of this planning scheme policy;
 - Part 9 - Standard specifications of this planning scheme policy.
- Perimeter sub-surface soil drainage is constructed on a median or traffic island which is landscaped in accordance with section 3.4.9.4 - Sub-surface drainage of a road and section 3.4.10.1(9) of this planning scheme policy.

3.4.10 Traffic islands, traffic signs and road markings

3.4.10.1 Medians and traffic islands in a road

- Medians and traffic islands are designed in accordance with Austroroads and the Department of Transport and Main Roads - Road Planning and Design Manual.
- Medians are cast in situ. Precast islands are not permitted unless otherwise approved by the local government.
- Medians and traffic islands are indicated by conspicuous raised kerbs, pavement markings or flush treatment as detailed in the Queensland Government's Manual of Uniform Traffic Control Devices (Queensland) and may be classified as follows:
 - channelising (or directional) islands;
 - roundabouts;
 - median islands;
 - medians;
 - separators;
 - pedestrian refuge islands.
- A median is not less than 1.2 metres wide unless otherwise approved by the local government.
- In an Urban arterial road, the minimum spacing between median openings is 500 metres.
- Raised kerbed traffic islands less than 12.0m² or less than 2 metres wide between kerb faces are:
 - constructed of concrete;
 - designed for occasional heavy vehicle wheel loadings;
 - where constructed of concrete, are a minimum of 100mm thick reinforced concrete with SL72 mesh on a firm sand bedding
 - constructed directly on top of the existing pavement and connected by dowels.
- Raised kerbed medians and raised kerbed traffic islands greater than 12.0m² or wider than 2 metres:
 - are excavated in the road pavement to subgrade level;
 - are landscaped:
 - with grass; or
 - where landscaping other than grass has been approved by the local government, incorporate a 500mm wide reinforced concrete strip as a working area for garden maintenance in accordance with standard drawing IPWEA RS-140 and IPWEA RS-142 in Table 8.1.1.1 - Standard drawings for movement infrastructure of Part 8 - Standard drawings of this planning scheme policy;
 - include water supply conduits and services every 80 metres with a minimum of one service per median or traffic island;
 - include an approved conduit for an electricity service to a median or traffic island that is landscaped in a location that allows ease of connection of a future electricity service.
- Where the slope across a median or traffic island is greater than 1 in 4, the median or traffic island is surfaced with concrete or another treatment approved by the local government.
- Where a surface treatment other than concrete has been provided for a median or traffic island, sub-soil drainage is installed in the median or traffic island directly behind kerbs in accordance with standard drawing IPWEA RS-140 and IPWEA RS-142 in Table 8.1.1.1 - Standard drawings for movement infrastructure of Part 8 - Standard drawings of this planning scheme policy.
- Water and electricity services are provided to a median or traffic island which has been landscaped.

3.4.10.2 Traffic signs and road markings

- Traffic signs and road markings are provided in accordance with the Manual for Uniform Traffic Control Devices (Queensland).
- A temporary sign, a construction sign and road markings are provided in accordance with Part 3 of the Manual for Uniform Traffic Control Devices (Queensland).
 - A sign post is:
 - set into a concrete slab and installed using "Loc socket" or an equivalent method;
 - vandal-proof bolts and fittings are used on a permanent sign.

3.4.10.3 Road name signs

- A road name sign is manufactured and installed in accordance with standard drawing IPWEA RS-130 in Table 8.1.1.1 - Standard drawings for movement infrastructure of Part 8 - Standard Drawings of this planning scheme policy.
- Road names:
 - are easy to pronounce;
 - consist of one word;
 - are socially acceptable.
- Road names may be designated:
 - as avenue, court, crescent, drive, esplanade, lane, parade, road, street or terrace; or
 - in accordance with standard drawing IPWEA RS-130 in Table 8.1.1.1 - Standard drawings for movement infrastructure of Part 8 - Standard Drawings of this planning scheme policy.

3.4.10.4 Road edge guide posts and guard rails

- Road edge guide posts are provided at all locations where a concrete kerb and channel is not constructed.
- A guardrail is provided in the locations specified by the Department of Transport and Main Roads - Road Planning and Design Manual.
- A guide post and a guardrail are provided which comply with standard drawings DTMR SD1474 and LCC 8-00401 in Table 8.1.1.1 - Standard drawings for movement infrastructure of Part 8 - Standard Drawings of this planning scheme policy.

3.4.11 Roadworks on unpaved or common boundary roads

- Where development adjoins a road that is unpaved, unformed or substandard for the ultimate design of the road, the road frontage is constructed as:
 - the nominated road hierarchy determined in accordance with Table 3.4.4.2.1 - Road design standards of this planning scheme policy;
 - the greater of:
 - sealed pavement of one half of the full width of the road for the nominated road hierarchy in accordance with Table 3.4.8.2.1 - Pavement design standards for a road of this planning scheme policy; or
 - a 5.5 metre sealed pavement in accordance with Table 3.4.8.2.1 - Pavement design standards for a road of this planning scheme policy;
 - a 1 metre sealed shoulder;
 - a table drain;
 - if required by the local government, a turning area at the end of the road in accordance with section 3.4.4.9 - Turning area at the end of a road of this planning scheme policy.
- Where it is proposed that a new road is constructed along a common boundary with an adjoining property, the road frontage is constructed as:
 - the nominated road hierarchy determined in accordance with Table 3.4.4.2.1 - Road design standards of this planning scheme policy;
 - the greater of:
 - sealed pavement of one half of the full width of the road for the nominated road hierarchy in accordance with Table 3.4.8.2.1 - Pavement design standards for a road of this planning scheme policy; or
 - a 5.5 metre sealed pavement in accordance with Table 3.4.8.2.1 - Pavement design standards for a road of this planning scheme policy;
 - a 1 metre sealed shoulder;
 - a table drain;
 - a minimum of 1 metre wide verge adjacent to the adjoining property boundary;
 - if required by the local government, shall include a turning area at the end of the road in accordance with section 3.4.4.9 - Turning area at the end of a road of this planning scheme policy.

3.4.12 Bridge and major culvert works

3.4.12.1 Bridge and major culvert design

- All road traffic bridges, pedestrian bridges, structures to support road traffic and structures other than bridges but associated with roads are designed in accordance with the following:
 - AS 5100 Set: 2007 Bridge design - Set;
 - AS/NZS 3845: 1999: Road safety barrier systems;
 - Department of Transport and Main Roads' standard drawings;

- d. AS/NZS 3725: 2007: Design for installation of buried concrete pipes;
- e. AS 1597.1:2010: Pre-cast reinforced concrete box culverts - Small culverts;
- f. AS 1597.2: 1996 and supp 1-1997: Pre-cast reinforced concrete box culverts - Large culverts.
2. Prior to commencement of detailed design, the local government's requirements with respect to the form of paths service duct provisions, flood frequency immunity and acceptable construction are obtained.
3. Prior to the commencement of the bridge design process, the local government's requirements with respect to the design criteria need to be obtained. AS 5100.1-2004 /Amdt 1-2010 Bridge design - scope and general - principles Appendix A lists design criteria which need to be resolved prior to commencing the design process.
4. All road bridges:
 - a. are concrete structures;
 - b. incorporate minimum 2.5 metre wide paths between handrails and bridge kerbs;
 - c. include service ducts which are accessible from the paths;
 - d. are service ducts with a minimum depth of 400mm deep and a minimum width of 1,200mm.
5. Approach embankments are of sufficient width to accommodate a minimum 2.5 metre wide path fitted with handrails abutting the bridge path.
6. Where the approach embankment exceeds 2 metres in height, a minimum 1.2 metre high chain wire fence is to be provided at the top of the embankment.
7. Afflux calculations demonstrate that bridges and culverts constructed over or within waterways result in no worsening of flood levels on properties upstream and downstream of the bridge or culvert.
8. Copies of all approvals are required from other relevant agencies in relation to bridge construction to be submitted to the local government with the engineering design documentation.
9. The following concrete work is coated in an approved non-sacrificial, anti-graffiti protection system:
 - a. abutment and wing walls;
 - b. piers, piles and site caps;
 - c. facings of reinforced soil structures;
 - d. service duct covers;
 - e. barrier walls;
 - f. easily accessible areas.
10. A brass plug PSM and brass Date-plaque is installed on one of the bridge abutments in a location approved by the local government.
11. Terrestrial and aquatic fauna movement solutions are included in all waterway crossings.

3.4.12.2 Pedestrian bridges

1. Pedestrian bridges are designed in accordance with section 3.4.12.1 - Bridge and major culvert design of this planning scheme policy and:
 - a. AS (Set)-2010: Design for access and mobility Set;
 - b. the provisions of Austroads with respect to bicycles.
2. The minimum clear width for a pedestrian bridge is:
 - a. 2.5 metres; or
 - b. where it is deemed necessary for the local government to access the pedestrian bridge with maintenance vehicles, 3.5 metres.
3. A pedestrian bridge that incorporates timber elements:
 - a. incorporates termite management systems;
 - b. is designed:
 - i. to achieve a 50 year design life;
 - ii. in accordance with:
 - A. AS 1720.1-2010: Timber structures-design methods;
 - B. AS 3660 (Set): Termite management.
4. A design report must include:
 - a. horizontal and vertical geometry;
 - b. hydrologic and hydraulic data;
 - c. statements on environmental impact, aesthetics and future maintenance;
 - d. specification codes and design loads used for loading calculations.

3.4.13 Noise barriers

3.4.13.1 Acoustic fence design

1. Acoustic fences are designed and constructed:
 - a. in accordance with the Queensland Department of Transport and Main Roads Specification MRS 15 (Noise Fences) and Technical Standard MRTS 15 (Noise Fences);
 - b. in accordance with the Road Traffic Noise Management Code of Practice;
 - c. in accordance with standard drawing LCC 8-00390 in Table 8.1.1.1 - Standard drawings for movement infrastructure of Part 8 - Standard Drawings of this planning scheme policy;
 - d. to not impede fauna movement.
2. The minimum density of panel material used in the construction of an acoustic fence is 12.5 kg/m², where the minimum panel thickness is:
 - a. 25mm wood cladding at a moisture content of 8-18 percent with a protective top capping;
 - b. 2.5mm for reflective steel sheets; or
 - c. from a material that meets a minimum surface mass density of 12.5kg/m².
3. Any gaps in the acoustic fence:
 - a. are less than 1 percent of the total surface area of the acoustic fence; or
 - b. where 1 percent or more of the total surface area of the acoustic fence, are filled with acoustic sealant.
4. An acoustic fence:
 - a. has a design life of 40 years;
 - b. is low maintenance;
 - c. is a minimum of 1.8 metres height;
 - d. includes water supply conduits and services installed every 80 metres along the carriageway side of the acoustic fence;
 - e. allows for stormwater/flood movement (and overland flow) without diminishing its overall acoustic performance.
5. Acoustic fences are protected by an approved anti-graffiti treatment and designed to withstand damage by resisting:
 - a. an impact from a 4 kg steel ball dropped from a height of 3 metres when the panel is supported horizontally;
 - b. defacement by sharp implements;
 - c. ignition by cigarettes, cigarette lighters or similar ignition sources.

3.4.13.2 Visual amenity of acoustic fences

1. An acoustic fence is screened by three levels of trees, shrubs and other plants within a landscaped frontage area in accordance with the following:
 - a. the acoustic fence is located a minimum of 6 metres from a road carriageway;
 - b. the minimum 6 metre area between an acoustic fence and a road carriageway provided in paragraph (a), includes:
 - i. a minimum 2 metre wide landscaped frontage area between the acoustic fence and the road carriageway;
 - ii. a minimum 4 metre wide clear verge between the road carriageway and the landscaped frontage area associated with the acoustic fence;
 - c. the minimum 2 metre wide landscaped frontage area screens the acoustic fence by planting in the 1 metre wide area closest to the acoustic fence, trees or shrubs are:
 - i. planted at spacings to ensure full screening at maturity;
 - ii. that have a mature height of approximately the same height as the acoustic fence;
 - d. in the 1 metre wide area closest to the carriageway, shrubs:
 - i. planted at 0.9 metres spacings;
 - ii. that have a mature height of approximately 0.9 metres.

3.4.13.3 Earth mounds

1. An earth mound proposed as a noise barrier is landscaped in accordance with the standard specifications in Part 9 - Standard specifications of this planning scheme policy.
2. Earth mounds are constructed:
 - a. within the road reserve;
 - b. to provide a minimum 4 metre wide clear verge between the edge of an earth mound and a road carriageway.
3. An earth mound is designed to:
 - a. ensure sufficient road reserve width is provided for the mound to achieve the required height while ensuring the slope of the batter is a maximum of 1 in 4;
 - b. have a minimum top width of 1 metre;
 - c. include drainage of the mound and adjoining area to the roadway drainage system;
 - d. ensure a 3.5 metre clearance from the toe of the batter to the property boundaries to permit access by maintenance vehicles;
 - e. include water supply conduits and services installed every 80 metres along the carriageway side of the earth mound.

3.4.14 Construction standards for movement infrastructure

1. Pedestrian paths, cycle paths and roads are constructed in accordance with standard specifications specified in column 1 of Table 9.1.1.1
- Application of standard specifications of Part 9 - Standard specifications of this planning scheme policy.

3.5 Road lighting standards

3.5.1.1 Design standards for road lighting

1. The objective of road lighting is to increase the safety and amenity of pedestrians in public areas and to improve traffic safety and operation at intersections and hazardous locations.
2. Development is to provide lighting that deters criminal activity and anti-social behaviour and contributes to the amenity of the area through increased aesthetic appeal by using Crime prevention through environmental design (CPTED) principles.
3. Road lighting complies with:
 - a. AS/NZS 1158 Set: 2010: Lighting for roads and public spaces Set;
 - b. in respect of lighting roads in rural areas, chapter 17 (Lighting) of the Department of Transport and Main Roads - Road Planning and Design Manual;
 - c. Part 12 (Roadway lighting) of Austroads;
 - d. Energex policies and public lighting manuals;
 - e. the lighting categories in Table 3.5.1.1.1 - Lighting categories of this planning scheme policy.
4. Development in a non-urban area provides a minimum lighting standard of L22 unless approved otherwise by the electricity provider, except where the development abuts a Major Road¹ where category V lighting may also be required.
5. Supplementary road lighting is provided:
 - a. at a pedestrian crossing that is not controlled by traffic signals;
 - b. that complies with:
 - i. AS/NZS 1158 Set: 2009: Lighting for roads and other public spaces - Lighting of pedestrian crossings;
 - ii. the requirements of the electricity service provider.
6. Category P lighting is provided in accordance with AS/NZS 1158 Set:2010: Lighting for roads and public spaces at a:
 - a. roundabout;
 - b. local area traffic management device;
 - c. pedestrian refuge;
 - d. speed control device on the carriageway.
7. A lesser lighting standard may be provided to that identified in section 3.5.1.1(6) of this planning scheme policy where the local government is satisfied that:
 - a. the lighting standard does not compromise safety;
 - b. a local area traffic management device is installed as part of a local area traffic management system.
8. Street lights are installed to achieve a balanced streetscape and street light poles are installed:
 - a. alternately on the opposite sides of the road in a staggered arrangement; or
 - b. on the same side of the road that accommodates any footpath or cycleway.
9. Intersection lighting of Non-Urban Roads complies with:
 - a. Figure 17.1 - Warrants for consideration of road lighting of the Queensland Department of Transport and Main Roads - Road Planning and Design Manual; Note - In respect of subsection (a), strict adherence to the warrants in Figure 17.1 is not intended, particularly where traffic volumes suggest no lighting is necessary. Designers are to exercise good engineering judgement and consider all relevant issues including road geometry, visibility, speed environment and accident history of the location.
 - b. Figure 3.5.1.1.1 - Flag lighting at isolated intersections - Non-urban roads of this planning scheme policy in locations that require lighting:
 - i. for indication purposes; or
 - ii. to highlight localised conflicts that do not meet the warrants for intersection lighting in Figure 17.3 - Warrants for consideration of road lighting of the Queensland Department of Transport and Main Roads - Road Planning and Design Manual.

Note - The intersection lighting referred to in section 3.5.1.1(9)(b) is termed 'flag' lighting and is serviced by one or more lights.

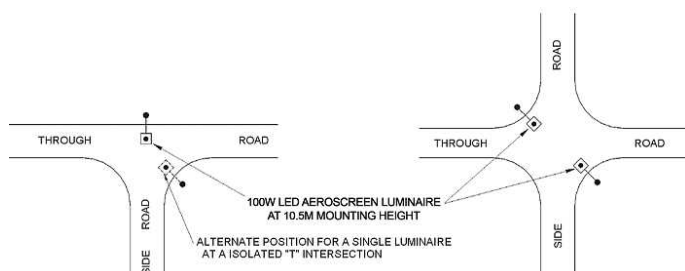
¹ See Table 3.4.4.2.1 - Road design standards of this planning scheme policy.

Table 3.5.1.1.1 - Lighting categories

Road function	Location	Basic road type	Lighting category
Access	Urban	Urban Access Street	P4
		Urban Access Road	P3, P4
		Urban Neighbourhood Access Road	P3, P4
	Non-Urban	Rural Access	Intersections, cul-de-sacs, bends, bridges, potential hazards, night time accident history
	Industrial	Industrial Access	P3, V5
Collector	Urban	Main Street	V3, V5
		Urban Collector Single	P3, V3, V5
	Non Urban	Urban Collector Dual Carriageway	P3, V3, V5
		Rural Collector	Intersections, cul-de-sacs, bends, bridges, potential hazards, night time accident history
Arterial	Urban	Industrial Collector	P3, V5
		Urban Arterial Single Carriageway	V3, V5
	Non Urban	Urban Arterial Dual Carriageway	V3, V5
		Rural Arterial Single Carriageway	Intersection Lighting - Refer to Fig 17.1 of the Road Planning and Design Manual
Multi-Model	On Bus Route	Rural Arterial Dual Carriageway	Intersection Lighting - Refer to Fig 17.1 of the Road Planning and Design Manual
Pathway & Cycleway		Transit	V3, V5
			P1 to P4

¹ Refer to AS/NZS 1158 Set: 2010: Lighting for roads and public spaces Set.

Figure 3.5.1.1.1 - Flag lighting at isolated intersections - Non-urban roads



3.5.1.2 Design standards for road light poles, lamps and luminaries

1. A road light pole is provided which is:
 - a. made of timber or steel, unless otherwise required by the service provider;
 - b. one of the following:
 - i. a frangible/slip base pole in accordance with AS/NZS1158.1.2: 2010: Road lighting - Vehicular traffic (Category V) lighting - Guide to design, installation, operation and maintenance; or
 - ii. in laneways and other areas inaccessible to an elevated working platform vehicle, a hinged pole with five metre mounting height and 0.5 metre integral outreach; or
 - iii. on roundabouts, a hinged high mast pole.

2. The outreach bracket length on a road light pole is provided to:
 - a. be the length of the existing outreach brackets, where there is existing lighting;
 - b. where there is no existing lighting to be a minimum of:
 - i. 1.5 metres for a steel pole;
 - ii. 1.2 metres for a timber pole.
3. A LED aeroscreen luminaire is used on a major road, unless otherwise approved by the electricity provider;
4. A LED or an S70 aeroscreen luminaire is used for low wattage road lighting on a minor road, unless otherwise approved by the electricity provider;
5. A LED aeroscreen luminaire, unless otherwise approved by the electricity provider, is used to light local area traffic management devices on Lighting Category P3 and P4 roads and:
 - a. is mounted on a road light pole;
 - b. has a maximum height of 6.5 metres;
 - c. where decorative fittings, such as avenue brackets and estate columns, are being used, has an outreach bracket of 0.5 metres and a mounting height of 5.3 metres.
6. New luminaries and brackets match an existing installation where the development joins to an existing installation or is a stage of a staged development.
7. No opal sphere luminaries are provided.
8. Nostalgia and avenue bracketed luminaries are only provided for decorative use on an Urban Access Street, Urban Access Road, Urban Neighbourhood Access Road or match existing lighting on a pathway or a cycleway.
9. No decorative lighting on Lighting Category V, P1 and P2 roads is provided.

3.5.1.3 Lighting of public thoroughfares

1. Lighting for a public thoroughfare such as a pathway, a cycleway and a pedestrian subway is provided that complies with:
 - a. Austroads;
 - b. Category P lighting as described in AS/NZS 1158 Set:2010: Lighting for roads and public spaces;
 - c. section 3.4.3.6 - Lighting of a cycle path of this planning scheme policy.
2. Unless otherwise approved by the electricity provider, lighting of park pathways or cycleways by LED luminaries, mounted on a 5 metre mid hinged steel pole, are provided with an integral outreach of:
 - a. where there is existing lighting, the length of the existing outreach; or
 - b. where there is no existing lighting, 0.5 metres.

3.5.1.4 Alignment of road lighting

1. On a verge that:
 - a. does not exceed four metres, the road light pole alignment is 3.075 metres from the boundary of the premises;
 - b. exceeds four metres, the road light pole alignment is 1 metre behind the face of a kerb.
2. Pole alignment in street light schedules is shown as the distance from the real property boundary.
3. A road light pole is only placed on a 500mm alignment from a property boundary when it is needed to facilitate a crossover and the property is:
 - a. a rear lot; or
 - b. at the head of a cul-de-sac.
4. A road light pole is offset by 1 metre from a water supply road crossing conduit, provided access to a lot is not affected.
5. A road light pole is provided on the approach side of an intersection, a roundabout and a traffic management device.
6. A road light pole is provided on the inside of a bend or curve.

3.6 Stormwater infrastructure standards

1. A conceptual site based stormwater management plan is required for development being a material change of use or a reconfiguring a lot where stormwater quality, frequent flow management or waterway stability infrastructure is being provided.
2. A detailed site based stormwater management plan is required for development being an operational work application where stormwater quality, frequent flow management or waterway stability infrastructure is being provided.
3. The stormwater network is planned and designed in accordance with the Queensland Urban Drainage Manual and the Australian Rainfall and Runoff (2016), except as modified by Section 3.6 (Stormwater infrastructure standards).
4. Australian Rainfall and Runoff (2016) methodology for rainfall runoff generation and hydrograph estimation is to be followed.

3.6.1 Planning the stormwater network

3.6.1.1 Relationship with other matters

1. The stormwater network is planned, designed and constructed having regard to:
 - a. Flood hazard overlay code;
 - b. the Waterway corridors and wetlands overlay code;
 - c. the Infrastructure code as it relates to the:
 - i. parks network;
 - ii. pedestrian and cycle network.

3.6.1.2 Multifunctional network

1. The function of the stormwater network is to:
 - a. manage stormwater to ensure that it causes minimal nuisance, damage or danger to people, property or the environment (stormwater quantity infrastructure);
 - b. minimise the impacts of development on receiving environments through:
 - i. limiting pollutant loads discharging to receiving waters (stormwater quality infrastructure);
 - ii. minimising the change in frequency of disturbance to aquatic ecosystems by managing the volume and frequency of surface runoff during small rainfall events (frequent flow management infrastructure);
 - iii. controlling bed and bank erosion in waterways (waterway stability infrastructure).

3.6.1.3 Stormwater quantity infrastructure

1. Stormwater quantity infrastructure is provided to convey stormwater runoff from the development site to a lawful point of discharge in accordance with the Queensland Urban Drainage Manual, except as amended in 3.6.1.3(2) or 3.6.1.3(3).
2. On a site, other than in the Loganholme local plan area, an increase in the runoff rate from a development site is to be mitigated on site unless it can be demonstrated that a regional stormwater system has adequate capacity to cope with the increased runoff and the stormwater infrastructure downstream of the site has adequate capacity to convey the increased runoff.
3. Where the development site is located in the Loganholme local plan area and:
 - a. identified as a site requiring a lawful point of discharge on Figure 3.6.1.3.1 - Loganholme: stormwater management, a lawful point of discharge is obtained or development is to demonstrate that stormwater can be managed on site incorporating low impact design approaches including:
 - i. minimising the amount of water running off site; or
 - ii. maximising the amount of water that can be directed towards the lawful point of discharge (e.g. roof water to the road frontages on the high sides of lots);
 - b. within the Torres Street catchment identified on Figure 3.6.1.3.2 - Loganholme: Torres Street catchment, on site flood detention measures are required to achieve no increase in the flood events anywhere upstream of the Beenleigh-Redland Bay Road for the 1 percent AEP flood event in accordance with the following:
 - i. detention volume (m³) = 0.02 x IA (m²);
 - ii. outlet pipe diameter (m) determined from the following equation:

$$D \leq \sqrt{\frac{4 \times (0.0708 \times TC - 0.0211 \times IA)}{600\sqrt{2 \times 9.81 \times H}}}$$

Where IA = Additional Impervious area created by the development (m²)

TC = Impervious area discharging into the tank (m²). This must be at least 40 percent of the total additional development area

D = Outlet pipe diameter (m)

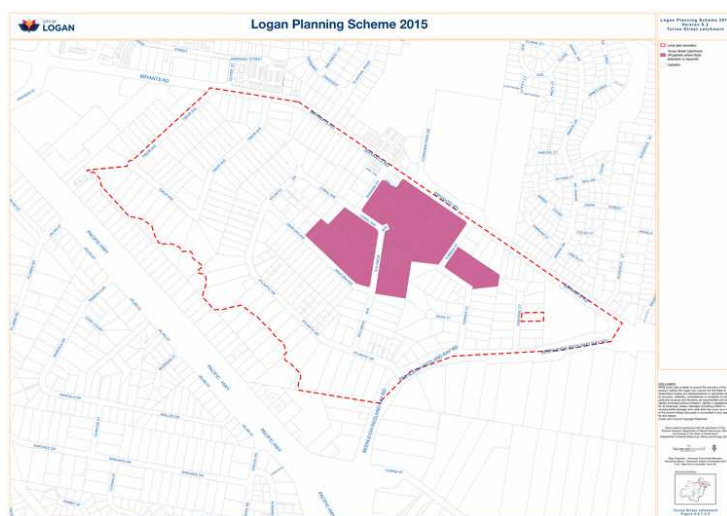
H = Maximum flood storage depth above the outflow (m)

- c. not within the Torres Street catchment identified on Figure 3.6.1.3.2 - Loganholme: Torres Street catchment, stormwater detention may not be required. Editor's note - These provisions are to be read in conjunction with the whole planning scheme policy, including section 3.6.2.10 No worsening. Editor's note - This exemption is highly specific to the geography of the Loganholme local plan area and is not applicable to any other area within this or other catchments.
- d. not identified as a lot requiring a lawful point of discharge on Figure 3.6.1.3.1 - Loganholme: stormwater management and the lot contains a mapped waterway, development may discharge directly to the mapped waterway.

Figure 3.6.1.3.1 - Loganholme: stormwater management



Figure 3.6.1.3.2 - Loganholme: Torres Street catchment



3.6.1.4 Stormwater quality, frequent flow management and waterway stability infrastructure

1. Stormwater quality, waterway stability and frequent flow infrastructure is provided to achieve the stormwater management design objectives where the development is a:

- a. material change of use for urban purposes where:
 - i. the development is greater than 2,500m² and results in the creation of six or more additional dwellings; or
 - ii. the impervious area of the development is greater than 25 percent and the development is:
 - A. greater than 2,500m²; or
 - B. located in the Loganholme local plan area; or
 - C. included in the Highway business precinct of the Specialised centre zone and located between the Pacific Highway and the southern boundary of the Loganholme local plan area; or
 - b. reconfiguring a lot for urban purposes where:
 - i. the development is greater than 2,500m² and where it:
 - A. results in an increased number of non-residential lots (e.g. industrial, commercial, etc); or
 - B. it results in the creation of six or more residential lots;
 - ii. located in the Loganholme local plan area and results in a total of four or more lots; or
 - iii. where included in the Highway business precinct of the Specialised centre zone and located between the Pacific Highway and the southern boundary of the Loganholme local plan area and results in a total of four or more lots.
2. Section 3.6.1.4(1) of this planning scheme policy does not apply where the development captures and manages the first 10mm of runoff per day from all impervious areas using:
- a. evaporation of stormwater; or
 - b. reuse of stormwater (e.g. adequately sized rainwater tank with reuse facilities); or
 - c. infiltration to native soils or filtration through an appropriately designed soil and plant stormwater treatment system.
3. Section 3.6.1.4(1) of this planning scheme policy does not apply for waterway stability and frequent flow infrastructure where run-off from or within the site drains to a receiving waterway that is degraded.
- a. A waterway is degraded where:
 - i. the proportion of impervious area within the catchment, prior to the proposed development, is greater than 30 percent and the waterway stability objective has not been applied to any existing development within the catchment, prior to the proposed development; or
 - ii. the waterway is designed as 'highly disturbed' in Schedule 1 of the Queensland Environmental Protection (Water) Policy 2009. The stormwater management design objectives; or
 - iii. as determined by the local government.
4. Where identified as 'sites requiring a drainage easement' on Figure 3.6.1.3.1 - Loganholme: stormwater management, easements are provided in favour of Logan City Council to accommodate future stormwater infrastructure:
- a. in the 'Easement location' identified on Figure 3.6.1.3.1 - Loganholme: stormwater management; or
 - b. within the mapped waterway if development occurs on a lot not containing a marked 'Easement location' on Figure 3.6.1.3.1 - Loganholme: stormwater management.

3.6.1.5 Stormwater management design objectives

1. The design objective for stormwater quality is to achieve the minimum reductions in total pollutant load, compared with that in untreated stormwater runoff, from the development part of the site as set out in the State Planning Policy.
2. The design objective for frequent flow management is to:
 - a. provide a total stormwater capture volume in cubic metres (m³) equal to the impervious area (m²) multiplied by the target design runoff capture depth (mm/day) divided by 1,000;
 - b. manage the captured stormwater. This should include one or more of the following:
 - i. reuse of stormwater (including collection and use of roof water);
 - ii. infiltration to native soils (where adverse impacts will not arise);
 - iii. diversion of surplus flows around sensitive downstream receiving environments;
 - iv. evaporation of stormwater.
3. The spatial distribution of the required total stormwater capture volume in section 3.6.1.5(2)(a) of this planning scheme policy may be adapted to suit individual site conditions, provided that the required volume from all impervious areas is captured before leaving the site.
4. The design objective for frequent flow management requires that the capacity to capture the volume of runoff be available each day. The management system (whether reuse, infiltration or diversion) must therefore be capable of draining the captured stormwater within 24 hours.
Editor's note - Capturing the required volume of runoff reduces pollutant load and simultaneously improve water quality. Therefore, it may eliminate the need for separate additional storage to meet the objective for managing frequent flow.
5. The design objective for waterway stability is to limit the post-development peak one-year average recurrence interval (ARI) event discharge within the receiving waterway to the pre-development peak one-year ARI event discharge.
Editor's note - Pre-development is defined in Appendix B of Technical Note: Derivation of Design Objectives January 2009.

3.6.1.6 Trunk and non-trunk stormwater infrastructure

1. The stormwater network comprises the trunk stormwater network and non-trunk stormwater infrastructure.
2. The trunk stormwater network comprises existing trunk infrastructure and future trunk infrastructure planned to be provided up to 2021 in each of the stormwater network planning areas.
Editor's note - Future trunk infrastructure for the stormwater network is identified in Table SC 3.2.3 - Stormwater quantity network schedule of works in Schedule 3 - Local government infrastructure plan mapping and tables of the planning scheme.
Editor's note - The trunk stormwater quantity network and the stormwater service catchments are conceptually identified on Local government infrastructure plan map LGIP 05.00 - Plan for trunk stormwater quantity network in Schedule 3 - Local government infrastructure plan mapping and tables.
3. Development within a stormwater network planning area is required to provide stormwater infrastructure for premises that is consistent with the plan for trunk stormwater quantity infrastructure identified in the local government infrastructure plan. This includes ensuring development does not inhibit:
 - a. the delivery of the future trunk infrastructure identified in Table SC 3.2.3 - Stormwater quantity network schedule of works in Schedule 3 - Local government infrastructure plan mapping and tables;
 - b. any other future development from connection to the trunk stormwater quantity network.

3.6.1.7 Minor and major drainage systems

1. The stormwater network comprises a minor and major drainage system. Both drainage systems need to be planned, designed and constructed as one integrated system.
2. The minor drainage system fully contains and conveys relatively minor and frequent stormwater flow to prevent nuisance from stormwater runoff on-site as well as offsite. It may comprise infrastructure items including, but not limited to:
 - a. inlets;
 - b. underground drainage;
 - c. junction pits;
 - d. access chambers;
 - e. outlets;
 - f. field or kerb inlets installed to collect surface runoff from within allotments as well as the roof water provision for buildings;
 - g. cross drainage under minor roads such as low flow pipes or box culverts installed under floodways;
 - h. low flow pipes installed under drainage reserves or park areas.
3. The major drainage system conveys a design major storm event beyond the capacity of the minor drainage system. It may comprise both stormwater quantity and quality infrastructure items including, but not limited to:
 - a. open space channels, road reserves, grassed or vegetated channels, pavement expanses and other flow paths that can act as overland flow paths in excess of the capacity of the major drainage system;
 - b. culverts and bridges;
 - c. natural or constructed waterways;
 - d. detention or retention basins;
 - e. underground drainage;
 - f. other major water bodies.

3.6.2 Design standards for stormwater infrastructure

1. Stormwater infrastructure is provided in accordance with the Queensland Urban Drainage Manual and the Australian Rainfall and Runoff (ARR), except as modified by Section 6 - Stormwater infrastructure standards of this planning scheme policy.

3.6.2.1 Minor drainage system

1. A minor drainage system is provided that is designed for a storm event in accordance with the Queensland Urban Drainage Manual.
 2. The underground drainage systems, together with associated inlets, access chambers, outlets and other such infrastructure are designed to convey the discharge for the design minor storm event.
 3. A minimum blockage factor of inlets, grates and letter box openings to be considered in designing these components of the minor drainage system is in accordance with the Queensland Urban Drainage Manual.
 4. Road flows shall be restricted by:
 - a. the flow spread limitations on the road pavement and the position of kerb inlets as detailed in the Queensland Urban Drainage Manual;
 - b. achieving a D*V <= 0.4m²/s for flow transverse to the road alignment, where there is a potential risk to human safety. Otherwise a D*V <= 0.6m²/s may be acceptable for low risk area.
- Editor's note - Refer to Australian Rainfall and Runoff Project 10 Report (1) 'Appropriate Safety Criteria for People' and Report (2) 'Appropriate Safety Criteria for Vehicles' for guidance.
5. Where the minor drainage system is conveyed through a park or open space, the total flow for the design minor storm event must be contained within the drainage easement.

3.6.2.2 Major drainage system

1. A major drainage system is designed to convey the developed, unmitigated 100 year ARI storm event. However, the major drainage system must accommodate a provision for managing flows for storm events larger than 100 year ARI, such as an overland flow path with adequate freeboard.
2. The design of the major drainage system:
 - a. includes provision for the future development of buildings and earthworks on the land;
 - b. includes provision for an overland flow path;
 - c. achieves a freeboard of not less than 300mm above the 100 year ARI flood level;
Editor's note - 'In some instances it may be more appropriate to adopt higher freeboard in steeper streams due to roughness variability and sensitivity of Mannings 'n' values. The freeboard to the finished floor level of habitable area to be a minimum 500 mm.
 - d. achieves a flow depth and velocity product equal to or less than:
 - i. 0.6m^2 per second where there is no obvious danger to human life; or
 - ii. 0.4m^2 per second where there is an obvious danger to human life;
 - e. does not result in an increase to discharge or velocity rates external to the subject property;
 - f. makes consideration of blockages within the minor drainage system by adopting an appropriate level of debris blockage to the inlets of the minor drainage system.
3. The major drainage system is designed to comply to a maximum permissible flow depth within the road reserve of:
 - a. 300mm at the kerb (subject to velocity and pedestrian safety requirements);
 - b. 200mm in trafficable areas not being the kerb, where:
 - i. the flow depth is near uniform across its width; or
 - ii. the width of the trafficable area is a drainage reserve;
 - c. equal to the height of the kerb where the profile of the footpath prevents the flow from the roadway from entering onto the adjacent property;
 - d. 50mm above the height of the kerb where:
 - i. the fall across the footpath to the kerb is greater than 100mm;
 - ii. the profile of the footpath prevents flow from the roadways from entering onto the adjacent property;
 - iii. the floor level of the adjacent building is not less than 350mm above the top of the kerb;
 - e. 300mm above the roadway surface where the road is subject to transverse flow, such as from causeways and culverts overtopping.
4. The total overland flow for the designed major drainage system must be contained entirely within:
 - a. the road reserve;
 - b. a drainage reserve;
 - c. the overland flow path obtained through a park, open space or local government easement.
5. Wherever possible, the major drainage system (e.g., bio-retention and detention basins) shall be designed to be open air systems.
6. Where compliance with section 3.6.2.2(5) of this planning scheme policy cannot be achieved, any underground components shall be supported by an overhead or otherwise appropriately aligned and sized overland flow path.
7. Detention or bioretention basin systems (whether for reuse, infiltration or diversion) must be designed to be capable of draining the captured stormwater flows within 72 hours.

3.6.2.3 Lawful point of discharge

1. All development shall discharge to a lawful point of discharge in accordance with the Queensland Urban Drainage Manual.
2. Where the lawful point of discharge is to a park, the receiving waterway shall be an appropriately designed, naturalised and constructed within an existing channel or waterway. Any works undertaken within the park shall ensure that the park function is not degraded and the written permission of the asset owner is obtained prior to application being submitted to the local government.
3. A lawful point of discharge is established for development where the site slopes downward away from the road reserve and no inter-allotment drainage system exists. If the drainage system passes through a private property, a letter of consent from the owner(s) of downstream property(ies) must be submitted as a part of an approval process for the development application and a drainage easement obtained (refer to section 3.6.2.8 Inter-allotment drainage systems).

3.6.2.4 Safety

1. Stormwater infrastructure is designed to preserve and enhance public safety. This shall be achieved by methods including, but not limited to the following -
 - a. meeting velocity, depth and depth*velocity limitations for pedestrians and motor vehicles;
 - b. providing safe egress from detention systems;
 - c. ensuring that in the event of car park flooding, flooding is limited to a depth of 300mm and a depth*velocity product of $0.3\text{m}^2/\text{s}$;
 - d. applying the principles of crime prevention through environmental design;
 - e. adequate signage.

3.6.2.5 Design of roads

1. Except where modified by this planning scheme policy, development shall ensure that the drainage system meets flow depth, flow width, pedestrian and vehicle safety requirements for both minor and major storm conditions in accordance with Queensland Urban Drainage Manual, Australian Rainfall and Runoff Project 10 'Appropriate Safety Criteria for People' and 'Appropriate Safety Criteria for Vehicles'.
2. In addition to the requirements of Queensland Urban Drainage Manual and Australian Rainfall and Runoff, development shall ensure that:
 - a. the road reserve flow capacity is able to convey the minor and major design storm requirements;
 - b. flood depth over all roads does not exceed 300mm;
 - c. depth*velocity product assessment is undertaken for the assessment of pedestrian safety;
 - d. the depth*velocity product in all roads is less than or equal to $0.4\text{m}^2/\text{s}$, except where it is demonstrated that pedestrians will not be at risk, in which case it is less than or equal to $0.6\text{m}^2/\text{s}$.
3. For the purposes of adhering to the road classification specifications of the Queensland Urban Drainage Manual, urban collector and urban arterial roads shall be deemed to be major roads and urban access roads shall be deemed to be minor roads.
4. Development provides that non-frangible dome top grates are not used within the clear zone as defined by Austroads.

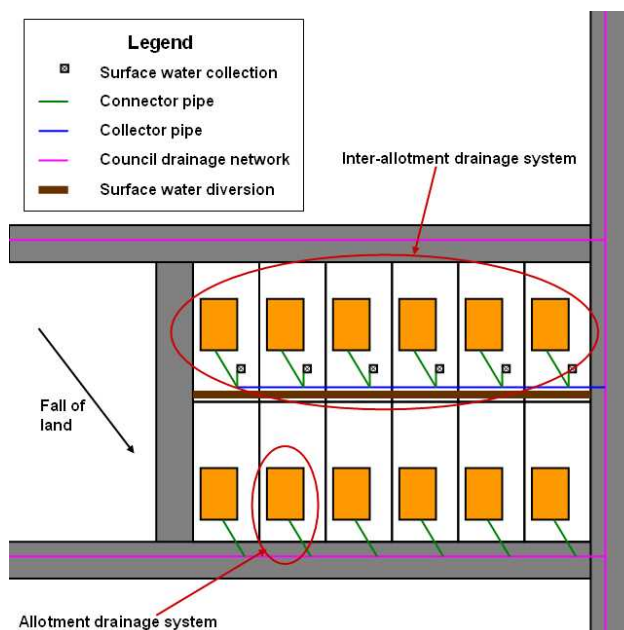
3.6.2.6 Waterway crossings

1. Waterways crossings such as, but not limited to, bridge and culvert crossings shall be designed and constructed in accordance with:
 - a. Australian Rainfall and Runoff;
 - b. Queensland Department of Transport and Main Roads - Fauna Sensitive Road Design Manual - Volume 2: Preferred Practices;
 - c. section 3.4.12 - Bridge and major culvert works of this planning scheme policy.

3.6.2.7 Allotment and inter-allotment drainage systems

1. Wherever site topography permits, premises shall drain roof and surface water to the adjoining road reserve or stormwater network (i.e. allotment drainage system).
2. Where site topography does not facilitate drainage of roof and surface water in accordance with section 3.6.2.7(1) of this planning scheme policy, then an inter-allotment drainage system is required.
3. The allotment and inter-allotment drainage systems are comprised of a number of key elements. Figure 3.6.2.7.1 - Allotment and inter-allotment stormwater drainage system of this planning scheme policy graphically depicts these elements.
4. For the management of allotment and inter-allotment drainage, all allotment drainage, connector pipes and surface water collection pits as depicted in Figure 3.6.2.7.1 - Allotment and inter-allotment stormwater drainage system of this planning scheme policy shall remain the responsibility of the lot owner.

Figure 3.6.2.7.1 - Allotment and inter-allotment stormwater drainage system



4. An allotment and inter-allotment drainage system must be in accordance with Table 3.6.2.7.1 - Allotment and inter-allotment drainage system requirements and Table 3.6.2.7.2 - Design standards for allotment and inter-allotment drainage system requirements of this planning scheme policy.

Table 3.6.2.7.1 - Allotment and inter-allotment drainage system requirements

Category	Zone	Number of lots feeding the system	Level of connector pipe design	Level of connector pipe and surface water collection design	Easement requirements
Urban residential	Medium density residential zone, Low-medium density residential zone, Suburban and small lot precinct in the Low density residential zone	1 lot	Queensland Urban Drainage Manual Level 2	N/A	N/A
		2 to 5 lots	Queensland Urban Drainage Manual Level 2	Queensland Urban Drainage Manual Level 2	Minimum 1.5m wide private easement in favour of upstream properties
		>5 lots	Queensland Urban Drainage Manual Level 2 or 3	Queensland Urban Drainage Manual Level 3 with minimum 300mm diameter pipe or Queensland Urban Drainage Manual Level 4	Minimum 1.5m wide private easement in favour of upstream properties
Suburban residential	Large suburban, Small acreage and Village precinct in the Low density residential zone.	1 lot	Queensland Urban Drainage Manual Level 2	N/A	N/A
		2 to 5 lots	Queensland Urban Drainage Manual Level 2	Queensland Urban Drainage Manual Level 2 or appropriately sized overland flow path	Minimum 1.5m wide private easement in favour of upstream properties
		>5 lots	Queensland Urban Drainage Manual Level 2 or 3	Queensland Urban Drainage Manual Level 3 with minimum 300mm diameter pipe, or Queensland Urban Drainage Manual Level 4	Minimum 1.5m wide private easement in favour of upstream properties
Rural residential	Park residential precinct in the Rural residential zone	2 to 5 lots	Queensland Urban Drainage Manual Level 2	Queensland Urban Drainage Manual Level 2 or appropriately sized overland flow path	Minimum 1.5m wide private easement in favour of upstream properties
		>5 lots	Queensland Urban Drainage Manual Level 2 or 3	Queensland Urban Drainage Manual Level 3 with minimum 300mm diameter pipe, or Queensland Urban Drainage Manual Level 4	Minimum 1.5m wide private easement in favour of upstream properties
Commercial and industrial	Centre zone, Specialised centre zone, Mixed use zone, Low impact industry zone, Medium impact industry zone	Impervious area less <1,001m ²	Queensland Urban Drainage Manual Level 4	Commercial and industrial areas shall connect directly to the local government stormwater network.	N/A
		Impervious area >1,000m ²	Queensland Urban Drainage Manual Level 5	Commercial and industrial areas shall connect directly to the local government stormwater network.	N/A

Note - For any other development type not mentioned in Table 3.6.2.7.1 an appropriate level and type of inter-allotment drainage system is to be adopted based on principles outlined in Queensland Urban Drainage Model and in consultation with local government.

Note - Where inter-allotment drainage is required for an upstream property external to the development, the maintenance of any stormwater infrastructure shall remain the responsibility of the property owner/s and an easement in favour of Council will be required.

Table 3.6.2.7.2 - Design standards for allotment and inter-allotment drainage system requirements

Item	Level applicable			
	II	III	IV	V
Minimum pipe size	150mm	225mm	375mm	
Minimum stub size	150mm	150mm	To be designed	
Pipe material	UPVC	UPVC, RCP, FRC	RCP, FRC	
Jointing system	RRJ, S&S	RRJ, S&S	RRJ, S&S	
Flow calculation	10L/s per allotment	Rational method	Rational method or runoff model	

ARI for design	2 year for development ≤ 20d/ha 10 year for development > 20d/ha	2 year for development ≤ 20d/ha 10 year for development > 20d/ha	20 years within the greater network	
Pipe system design	2 year for development ≤ 20d/ha 10 year for development > 20d/ha	2 year for development ≤ 20d/ha 10 year for development > 20d/ha	Full hydraulic analysis or pipe nomograph plus structure losses	Full hydraulic analysis with determination of H.G.L.
Major design storm overland flow check	Ensure the land development and its drainage system does not unlawfully concentrate flows onto, or aggravate flooding within, neighbouring properties. The overland flow path is to be identified within the design system and be based on full development (i.e. make allowance for buildings and earthworks etc.)			

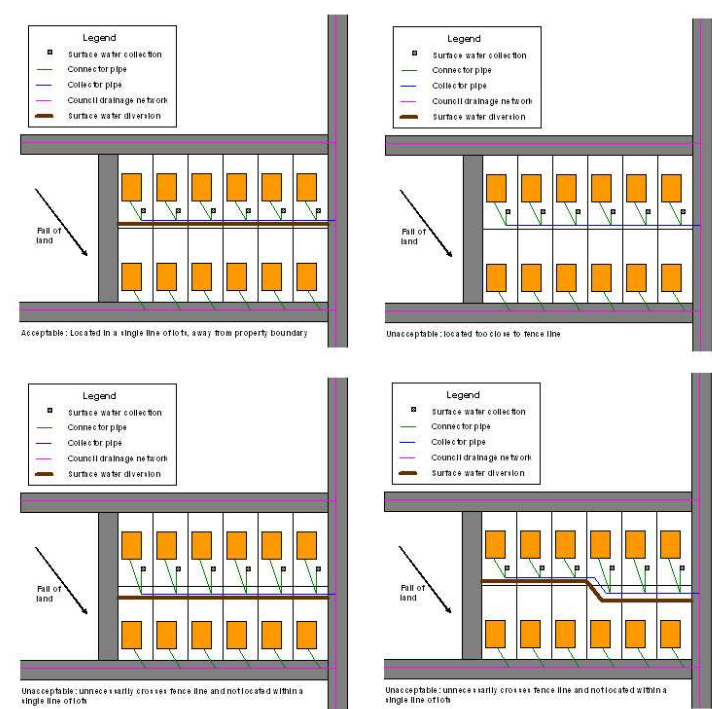
5. All pipes must have a minimum longitudinal gradient of 1.0 percent, except as altered by section 3.6.2.8 Inter-allotment drainage systems.
6. Soakage or rubble pits are not permitted in the urban residential, suburban residential, commercial or industrial areas category as identified in Table 3.6.2.7.1 - Allotment and inter-allotment drainage system requirements of this planning scheme policy. Soakage pits are permitted in the rural area category.
7. Charged roofwater systems are not permitted.
8. Drainage pits or inspection manholes are provided at all changes in allotment and inter-allotment drainage direction and connection points and above and below retaining walls..

3.6.2.8 Inter-allotment drainage systems

1. This section needs to be read in conjunction with section 3.6.2.7 - Allotment and inter-allotment drainage systems of this planning scheme policy. Where there is a conflict between the two sections, this section prevails.
2. A private easement is provided over all inter-allotment drainage systems in accordance with Table 3.6.2.7.1 - Allotment and inter-allotment drainage system requirements.
3. Inter-allotment drainage systems do not convey water from property under the control of the local government.
4. All collector pipes are located within a single line of lots, away from the property boundary as identified in Figure 3.6.2.8.1 - Location of collector pipes in inter-allotment drainage systems of this planning scheme policy.

Editor's note - Where water is conveyed from property under the control of the local government through a private property, an easement in favour of the local government is to be provided in accordance with 3.6.2.16 Easements in favour of Council.

Figure 3.6.2.8.1 - Location of collector pipes in inter-allotment drainage systems



3.6.2.9 Allotment and Inter-allotment drainage systems for peri-urban areas

1. In the Rural residential, Rural zone and Environmental management and conservation zone areas, the design and construction of the drainage system is the responsibility of the owner.
2. An overland flow path in the Rural residential, Rural zone and Environmental management and conservation zone areas is preserved or an open channel is constructed:

a. in accordance with the provisions of this planning scheme policy;

b. in accordance with depth*velocity safety provisions of Queensland Urban Drainage Manual and Equation 3.6.2.1 - Depth and velocity safety standards from Queensland Urban Drainage Manual;

c. to achieve a minimum freeboard of 500mm to all finished habitable floor levels within the site;

d. so batter slopes on any swale are no greater than 1:4 (V:H).
3. Where overland flow is conveyed within a road on site:

a. the maximum depth within kerb and channel is 300mm;

b. a minimum freeboard of 500mm is provided to all finished floor levels within the site.

Equation 3.6.2.1 - Depth and velocity safety standards from Queensland Urban Drainage Manual

$$d_g V_{ave} \leq 0.6m^2/s, \text{ or}$$
$$0.4m^2/s \text{ for areas where risk to personal safety is reasonably foreseeable;}$$

Where: d_g is the maximum flow depth (m)

V_{ave} is the average velocity within the flow path (m/s)

3.6.2.10 No worsening

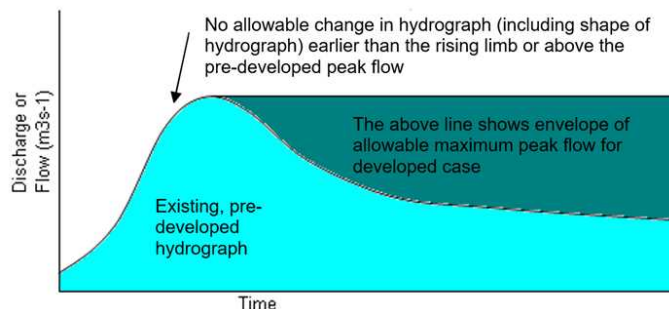
1. Development must achieve the principle of "no worsening", as per the provisions of this planning scheme policy.
2. In achieving the principle of no worsening, development:

a. does not result in a detrimental impact on the flooding, or flood risk of any area;

b. does not result in adverse impacts to any other property in terms of changes in peak discharge, flood levels, the frequency of flooding, the shape of the hydrograph, flow velocities, water quality, sedimentation or scour effects for the full range of ARI storm events up to and including

- the defined flood event;
- c. not result in an increase in peak discharge from the development site;
- d. ensures that the time of concentration to the peak of the event does not decrease and where it does increase, consideration is given to the impacts upstream, adjacent, and downstream of the property boundary so as to ensure runoff from the site does not bring the hydrograph peak closer to coincidence with the peak flow in adjoining catchments;
- e. undertakes a method of modelling agreed with the local government, upstream and, where appropriate, downstream of the site.

Figure 3.6.2.10.1 - Peak discharge and allowable change



3. Infrastructure which may be appropriate to contribute to compliance with the principle of "no worsening" includes:
 - a. stormwater detention systems;
 - b. controlled conveyance within the development site of flow which enters the site from upstream or adjacent areas;
 - c. infiltration areas;
 - d. stormwater storage and harvesting subject to availability of storage after a large rainfall event for mitigation of peak discharge;
 - e. where exceptional circumstance exist such that the existing overland flow path is highly degraded and both ecological and flood risk benefits can be achieved, channel enhancement and other rehabilitation measures.

3.6.2.11 Estimation of stormwater runoff

1. An estimation of runoff is calculated using rainfall-runoff modelling software (e.g. XP-RAFTS, XP-STORM or RORB, etc) where:
 - a. the catchment area is larger than 5 ha (As per Queensland Urban Drainage Manual's requirements for use of the Rational Method); or
 - b. an analysis of storage capacity (e.g. basin storage/stage discharge relationship) is required for an existing or proposed detention basin.
2. The Rational Method can be used for relatively small-scale catchment as well as for verifying the rainfall-runoff model. Some parameters for using the Rational Method is provided below

3.6.2.12 Flow Coefficient of runoff and Impervious fraction values

1. Development design shall adopt a coefficient of runoff and fraction imperviousness values in accordance with the Queensland Urban Drainage Manual.

3.6.2.13 Rainfall intensity values

1. Development shall be designed in accordance with the rainfall intensity-frequency-duration (IFD) data for the Logan City Council area. The IFD information used in development assessment and design must be catchment and location specific.

3.6.2.14 Standard inlet times

1. Development shall be designed in accordance with the standard inlet times contained in the Queensland Urban Drainage Manual.

3.6.2.15 Sensitivity analysis

1. Sensitivity analysis shall be undertaken for all modelled results.
2. The sensitivity of all results shall be assessed with regards to the influence of:
 - a. an increase in rainfall intensity of 10 percent;
 - b. a variation of all Mannings 'n' values of 10 percent to 20 percent depending on the circumstances on the implications/risk profile;
 - c. a variation of the tail water depth of +/- 10 percent;
 - d. blockage considerations as outlined in Queensland Urban Drainage Manual and Australian Rainfall and Runoff Project 11 Blockage of Hydraulic Structures.

3.6.2.16 Easements in favour of Council

1. An easement is provided over all drainage system elements, open or piped, that form part of the public stormwater infrastructure network that are not located within property under the control of the local government.
2. Stormwater drainage with an easement in favour of the local government achieves a minimum design standard of Queensland Urban Drainage Manual level III with a minimum pipe diameter of 375mm.
3. The easement shall be for the entire length of the drainage infrastructure that is not located within property controlled by the local government.
4. The easement shall be created in accordance with the *Land Title Act 1994*.
5. Any fences located within an easement in favour of the local government are demountable and removable.
6. Retaining walls are not located within an easement in favour of the local government.

3.6.2.17 Specifications for new easements in favour of Council

1. Easements shall be of a size so as to enable necessary works including, but not limited to construction, maintenance or inspection, to be carried out.
2. Easement widths shall be no less than the greater of:
 - a. three metres for all single pipes from 375mm up to 1,350mm diameter;
 - b. one metre wider than the width of the outer edges of the pipes or box culverts;
 - c. the width of the flow path required to carry:
 - i. the difference between the peak discharge for the 100 year ARI event and the capacity of the underground system; or
 - ii. freeboard of 300mm or greater and as outlined in the Queensland Urban Drainage Manual;
 - d. the width of:
 - i. any open channel;
 - ii. a maintenance track for the operation of maintenance vehicles along at least one side of the channel, in accordance with the Queensland Urban Drainage Manual;
 - iii. freeboard in accordance with the Queensland Urban Drainage Manual.
3. All drainage easements shall be sized and located so as to ensure they are not effected by, and do not impact on an existing building's footing zone of influence and give consideration to any future building footings on the subject or adjoining premises.
4. Where located in the Loganholme local plan area and identified as 'sites requiring a drainage easement' on Figure 3.6.1.3.1 - Loganholme: stormwater management, easements shall be provided in favour of Logan City Council to accommodate future stormwater infrastructure:
 - a. in the location identified on Figure 3.6.1.3.1 - Loganholme: stormwater management if development occurs on a lot containing a 'marked easement location'; or
 - b. within the waterway if development occurs on a lot not containing a 'marked easement location' on Figure 3.6.1.3.1 - Loganholme: stormwater management.
5. Where located outside the Loganholme local plan area and identified as 'sites requiring a drainage easement' on Figure 3.6.1.3.1 - Loganholme: stormwater management, easements shall be provided in favour of Logan City Council to accommodate future stormwater infrastructure.

3.6.2.18 Works within existing easements

1. Where development seeks to use an existing easement that is part of the local government's stormwater network, the local government's written consent is required prior to lodging a development application.

3.6.2.19 Where an easement cannot be obtained

1. Where a downstream property owner will not grant an easement, the local government may, at its discretion, accept a signed letter of agreement from the downstream property owner that:
 - a. states the owner agrees to the installation of stormwater drainage across or within their property without the encumbrance of an easement;
 - b. outlines the conditions by which the owner agrees to maintain the drainage infrastructure;
 - c. forms a legally binding agreement that will be placed as a property note on all premises involved.

3.6.2.20 Stormwater infrastructure located in a park or open space

1. A stormwater infrastructure item is only to be provided in or adjacent to a park or open space - where it results in an:
 - a. increase in the continuity of greenspace area;
 - b. improvement in overall amenity of the area.
2. If development cannot achieve the requirements of section 3.6.2.20(1) of this planning scheme policy, the stormwater infrastructure item must be located within a drainage reserve dedicated for the purpose of stormwater drainage.
3. A stormwater infrastructure item located within a park, open space, or drainage reserve shall be designed to:
 - a. reflect the natural character of the land and its surrounds;
 - b. preserve community safety;
 - c. allow for maintenance activities to be undertaken.

3.6.2.21 Stormwater infrastructure located in a waterway and wetland buffer area

1. A stormwater infrastructure item may only be provided in a waterway and wetland buffer area where the buffer area is degraded to such an extent that the construction of the stormwater infrastructure item would result in an enhancement to the condition and ecological function of the buffer area.
2. A stormwater infrastructure item may not be located within the waterway and wetland buffer area where the buffer area:
 - a. contains intact riparian vegetation; or
 - b. is located below the 20 year ARI flood level; or
 - c. adjoins a stream order 1 or 2 minor waterway as mapped in Logan City Council's Waterway corridors and wetlands overlay mapping; or
 - d. where the mapped waterway or wetland buffer is less than 30m in width, measured from the top bank.
3. Where a stormwater infrastructure item is located within a waterway or wetland buffer area, it shall be located a minimum distance of:
 - a. 10 metre extending perpendicularly outwards from the top of bank for waterways of stream order 3 or minor wetlands that is retained, restored or rehabilitated; or
 - b. 25 metre extending perpendicularly outwards from the top of bank for waterways of stream order 4 and 5 major wetlands or significant wetlands that is retained, restored or rehabilitated.

3.6.2.22 Stormwater infrastructure located in a road reserve

1. A stormwater infrastructure item may only be located within a road reserve where the item is a:
 - a. bioretention street tree approved in accordance with Table 4.2.1 - Guidelines for satisfying the performance outcomes of the landscape code of this planning scheme policy; or
 - b. streetscape bioretention system.

3.6.3 Stormwater quantity infrastructure

3.6.3.1 Minor drainage system

1. Minor drainage system elements are designed and constructed in accordance with the standard drawings identified in Table 8.3.1.1 - Standard drawings for stormwater infrastructure in Part 8 - Standard drawings of this planning scheme policy.

3.6.3.2 Pipe locations

1. Where sufficient verge width is available, stormwater pipes may be located in the verge to suit the service allocations of the local government.
2. In divided roads, stormwater pipelines may be located within the median and should be offset 1.5 metres from the centreline.
3. Where a minor pipe connects directly from one kerb inlet to another in the upper reaches of the street drainage system, it may be located underneath the kerb and channel.
4. Where a pipeline is greater than 600 mm in diameter, it should be located 2.0 metres from the invert of the kerb and channel towards the road centreline.
5. The minimum vertical and horizontal clearance between pipes of differing services shall be 300 mm.

3.6.3.3 Pipe size

1. Drainage pipes intended to be local government assets must be a minimum size diameter of 375 mm.
2. The local government may accept a minimum pipe size diameter of 300 mm for:
 - a. a low flow pipe;
 - b. a kerb and channel collection pipe.

3.6.3.4 Pipe cover

1. Development shall provide minimum cover over pipes in accordance with Table 3.6.3.4.1 - Minimum cover over pipes of this planning scheme policy.

Table 3.6.3.4.1 - Minimum cover over pipes

Location	Minimum cover (mm) Rigid type pipes (e.g. Concrete, FRC)
Residential private property and parks not subject to traffic	300
Private property and parks subject to occasional traffic	450
Footpaths	450
Road pavement and under kerb and channel	600

3.6.3.5 Pipe velocity limits

1. Pipe velocities are in accordance with Queensland Urban Drainage Manual and Table 3.6.3.5.1 - Acceptable flow velocities for pipes and box sections of this planning scheme policy.
2. It should be noted that hydraulic consideration may require the velocity be controlled to well below the "Desirable Maximum" and/or the pipe size increased to minimise drainage structure losses and the slope of the hydraulic grade line.
3. Where possible, development should ensure:
 - a. A minimum pipe velocity of 1.2m/s; and
 - b. A maximum pipe velocity of 4.0m/s.

Table 3.6.3.5.1 - Acceptable flow velocities for pipes and box sections

Flow condition	Absolute minimum ¹ (m/s)	Desirable minimum ¹ (m/s)	Desirable maximum ² (m/s)	Absolute maximum ² (m/s)
Partially full	0.7	1.2	4.7	7.0
Full	0.6	1.0	4.0	6.0

Note - ¹ Minimum flow velocities apply to 1 year ARI design storm and apply to all pipe materials.

Note - ² Maximum flow velocities apply to concrete pipes and other types subject to damage by abrasion or erosion.

Note - It should be noted that hydraulic consideration may require the velocity be controlled to well below the "Desirable Maximum" and/or the pipe size increased to minimise structure losses and the slope of the hydraulic grade line.

3.6.3.6 Pipe grade limits

1. Development must achieve the maximum and minimum grades for pipes specified in Table 3.6.3.6.1 - Acceptable pipe grades for full flowing pipes of this planning scheme policy.

Table 3.6.3.6.1 - Acceptable pipe grades for full flowing pipes

Column 1 Pipe diameter (mm)	Column 2 Maximum grade (%)	Column 3 Minimum grade (%)
300	20.0	0.50

375	15.0	0.40
450	11.0	0.30
525	9.0	0.25
600	7.5	0.20
675	6.5	0.18
750	5.5	0.15
900	4.5	0.12
1050	3.5	0.10
1200	3.0	0.10
1350	2.5	0.10
1500	2.2	0.10
1650	2.0	0.10
1800	1.7	0.10
1950	1.5	0.10
2100	1.4	0.10
2250	1.3	0.10
2400	1.2	0.10

Editor's note -

1. Based on maximum velocity for pipe flowing full of 6.0m/s.
2. Based on minimum velocity for pipe flowing full of 1.0m/s except where Note 4 is applicable.
3. Manning's $n = 0.013$ for all cased (concrete pipes).
4. The minimum grade of 0.10 percent is based on construction tolerance requirements.
5. The Maximum grade requirement (Column 2) applies to both the pipe grade and the hydraulic grade.
6. The Minimum grades (Column 3) apply to the pipe grade only.
7. Where the pipe is flowing less than half full for the design flow being considered, it is permissible to exceed the above maximum grades provided the velocity limits are not exceeded.

3.6.4 Channels

1. Where development is to provide a constructed stormwater drainage channel, it shall be constructed in accordance with the Queensland Urban Drainage Manual, Australian Rainfall and Runoff and the Brisbane City Council Technical Guidelines for Natural Channel Design, except as modified by this planning scheme policy.

3.6.4.1 Unlined channel flow velocities

1. Flow velocities in unlined channels shall be in accordance with the Queensland Urban Drainage Manual.
2. Where the Queensland Urban Drainage Manual does not specify a permissible velocity for a given combination of gradient and vegetation cover, then that combination of gradient and vegetation cover shall be taken to be unacceptable.

3.6.4.2 Bank slope requirements for constructed channels

1. The maximum bank slope gradients for constructed channels are 1:4 (V:H).

3.6.4.3 Allowable channel types

1. The types of allowable channel designs that can be constructed are to be in accordance with the Queensland Urban Drainage Manual.
2. Development in residential and rural areas shall use channel types C4, C5, C6 and C7.
3. Development in commercial and industrial areas shall use channel types C1, C2 and C3.
4. Where a proposed channel in a commercial or industrial area is located adjacent to parkland, environmental and/ or habitat corridors, open space or where a natural overland flow path exists across or adjacent to the development site, then channel types C4, C5, C6 and C7 shall be used.
5. The channel banks shall have a maximum gradient of 1 in 4, except:
 - a. on the outside of bends where steeper gradients may be appropriate; or
 - b. where shading of the channel bed from overbank trees is required to provide water temperature control, in which situation steeper gradients may be appropriate.
6. Public safety is maintained and enhanced through:
 - a. the provision of batter slopes with a maximum gradient of 1 in 4;
 - b. the design, provision and maintenance of bank and overbank vegetation;
 - c. where applicable, adopting the principles of Crime Prevention Through Environmental Design (CPTED) into the design of the channel.

3.6.5 Overland flow

3.6.5.1 Overland flow hydrology

1. With respect to overland flow hydrology and associated design, overland flow is comprised of both sheet flow and concentrated flow.
2. The maximum overland sheet flow length is:
 - a. 50m in urban areas; or
 - b. 200m in rural residential areas.
3. Overland sheet flow travel time is calculated using either:
 - a. Friend's Equation; or
 - b. the Kinematic Wave Equation.

Editors Note - Council's preference is that Friend's Equation (Queensland Urban Drainage Manual Equation 4.06) is used for this purpose.
4. Concentrated overland flow travel time shall be determined using Manning's equation and fall within the accepted time periods identified in the Queensland Urban Drainage Manual.

3.6.5.2 Overland flow design standards

1. Overland flow is to be provided such that:
 - a. the developed 100 year ARI flow is conveyed;
 - b. it is designed in accordance with the Queensland Urban Drainage Manual, ARR and the Brisbane City Council Technical Design Guidelines for Natural Channel Design;
 - c. existing overland flow paths are retained, maintained and protected;
 - d. existing waterway values are protected, enhanced and rehabilitated;
 - e. waterway stream flow lengths are not reduced;
 - f. no worsening of overland flow and potential associated flooding is achieved;
 - g. a minimum 500mm freeboard between the overland flow path 100 year ARI flow level and all finished floor levels is achieved; and
 - h. aesthetic amenity is enhanced.
2. Where modification of the overland flow path is unavoidable or necessary - the new overland flow path design must conform to the principle of no worsening and provide beneficial environmental enhancement.
3. Where possible and having regard for the type and scale of infrastructure concerned - development should provide interpretive/ educational opportunities.

3.6.6 Detention systems

1. Where development is to provide a detention system, it shall be constructed in accordance with the Queensland Urban Drainage Manual, ARR and the provisions of this planning scheme policy.

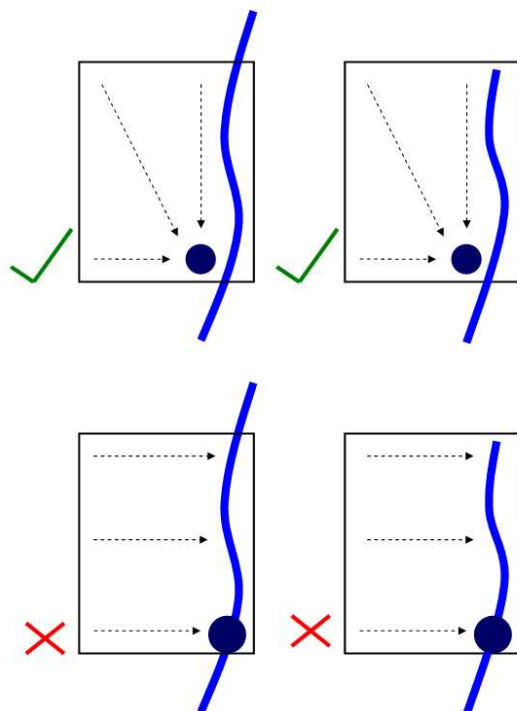
3.6.6.1 Acceptable types of detention systems

1. A variety of different detention systems are acceptable for use, provided they are suitable for site constraints, development type and intended ownership.
2. Detention basins are an acceptable type of detention system in all developments except where attenuated flood peaks from tributaries coincide with the main stem flood wave in a manner that causes or worsens overfloor flooding downstream.
3. Detention basins, incorporating stormwater quality treatment infrastructure items, are an acceptable type of detention system in all developments, subject to the bioretention basin's suitability to in-situ soil conditions.
4. Development may provide underground tanks, but this type of detention system will not be accepted as a local government asset.
5. Development may provide above ground tanks where site constraints prohibit the use of all other detention systems. However this type of detention system will not be accepted as a local government asset.
6. The local government will not accept the use of rainwater tanks as a detention system in any development.

3.6.6.2 Location of detention basins

- Detention systems are designed and constructed with an outlet device that is at or above the 2% AEP local or river flood level.
- Flood plain storage and function, and detention system functions are maintained. This shall include ensuring that:
 - detention system design does not remove flood plain storage;
 - detention systems continue to operate effectively during a major storm event.
- Detention basins falling within the flood plain area will be provided with compensatory excavation equal to the volume of the basin including both bunds and storage volume between the natural surface level and the invert of the detention weir. The pre and post development stage-storage relationships should remain essentially unchanged unless part of the local government approved flood mitigation scheme.
- Detention basins shall not be provided in locations that prevent easy access to or maintenance of the detention basin. In particular, detention basins within residential subdivisions shall be designed, located and constructed on land solely dedicated for stormwater management.
- Detention systems are to be designed as off-line systems.
- Off-line detention systems are to receive and detain stormwater prior to it entering:
 - a waterway, wetland or overland flow path that originates upstream of the development site; or
 - a waterway or wetland as shown in the Waterway corridors and wetlands overlay code; or
 - any other applicable overland flow path that originates within the development site itself.
- Figure 3.6.6.2.1 - Off-line detention systems in this planning scheme policy graphically show the principle expressed in section 3.6.6.2(5) above.

Figure 3.6.6.2.1 - Off-line detention systems



3.6.6.3 Design requirements

- Detention basins shall be designed and constructed such that:
 - the shape of the base maximises storage area and minimises flooded depth;
 - basin batter gradients are no steeper than 1:4 (V:H) or 1:6 (V:H) where designed for approved secondary use;
 - embankments have a top with a minimum width of 3m;
 - the inundation depth during the 20 year ARI event is equal to or less than 1.2m. However, where the system is a carpark - the depths shall be limited to 600mm during a 100 year ARI event;
 - freeboard is provided according to Table 3.6.6.3.1 - Freeboard requirements of this planning scheme policy.

Table 3.6.6.3.1 - Freeboard requirements

Location	Freeboard requirements
Assessable basin in urban area	0.3m with preferred minimum storage depth of 1.2m
Detention basin adjacent to road embankment	0.3m below edge of shoulder
Detention basin adjacent to railway embankment	Underside of ballast
Detention basins within urban development designed with high level spillways	0.3m or 10% of the 100 year ARI storage depth, whichever is the greater.

3.6.6.4 Vegetation specifications

- Detention basins shall be either grassed or planted with vegetation native to the local area, and appropriate to an inundated or intermittently wet environment.
- Trees are not generally considered appropriate within detention basins.
- If trees are provided within a detention basin, the design shall incorporate as far as possible the principles of Crime Prevention Through Environmental Design (CPTED).
- If trees are provided within a detention basin, the basin's size shall be increased by the volume of storage occupied by those trees at maturity. This volume shall be calculated using the equation below.

$$\text{Volume at maturity} = \text{no. of trees} \times (\pi \times (\text{Dbhm})^2 / 4) \times \text{dw}$$

Where:

- Dbhm is the diameter at breast height of a mature specimen of the specified tree;
- dw is the maximum depth of water in a design event.

3.6.6.5 Basin floor design

- The minimum cross gradient of a detention basin shall be:
 - 1:80 (V:H) for grassed basins; or
 - 1:100 (V:H) for vegetated basins.

3.6.6.6 Outflow characteristics

- All detention basins shall be designed and constructed with a minimum two staged outlet.
- The low level outlet is located low in the basin and is designed to allow normal flow discharge, with due consideration to any potential blockage of the outlet. The low level outlet may consist of:

- a. pipes;
- b. culverts.
3. Flows greater than the normal flow discharge shall be conveyed via a weir and pipe or spillway system with no increase in flow from all flood events up to the design event. Weir and pipe, or spillway systems shall be designed:
 - a. with a depth*velocity value across the weir or spillways of less than or equal to $0.6\text{m}^2/\text{s}$;
 - b. to ensure structural integrity of the basin is retained during any event, including spilling of the basin.
4. All outlets are to be designed such that:
 - a. blockages are prevented;
 - b. safety of the public and maintenance personnel is preserved;
 - c. intake provisions comply with Queensland Urban Drainage Manual;
 - d. scour protection and energy dissipation are provided within the development site boundary for the detention basin inflow and discharge.

3.6.6.7 Maintenance

1. Detention basins shall be designed to provide for maintenance.
2. All detention basins shall be designed and constructed with a reinforced concrete heavy vehicle access into the base of the detention basin, or equivalent.
3. Maintenance access must be provided for:
 - a. removal of sediment deposits from within the basin;
 - b. removal of debris and rubbish after flood events;
 - c. repair of cracking, erosion and leakage;
 - d. removal of undesirable tree and vegetation growth;
 - e. mowing;
 - f. reinstatement of basin materials and planting.

3.6.6.8 Detention basin size

1. Suitable sized detention basins are to be provided in accordance with ARR, the Queensland Urban Drainage Manual and the provisions of this planning scheme policy.
2. Detention basin size shall:
 - a. be determined using an appropriate computer model;
 - b. consider the function of the detention system within the catchment;
 - c. assess and satisfy the requirements for no worsening for the full range of ARI storm events up to and including the 100 year ARI event.

Editor's note - For sub-section (a) above - the use of only the Rational Method and/ or the methods detailed in the Queensland Urban Drainage Manual is not acceptable.
Editor's note - For sub-section (c) above - it is not acceptable to assess only the largest peak discharge from a designed basin, nor only the critical storm.

3.6.6.9 Management of detention systems

1. All detention systems, designed and constructed to become a Council asset, other than a detention system identified in a Local government infrastructure plan, shall be provided on land dedicated in favour of Council at no cost to Council.
2. All private on-site systems shall be maintained and managed by the private property owner. Such systems shall not be established on Council owned land, nor will they be accepted by Council as a Council managed asset.

3.6.6.10 Secondary uses for detention systems sites

1. Detention systems sites are to be designed and constructed primarily for flood mitigation purposes.
2. However detention systems sites can also be designed for a secondary purpose, that include:
 - a. usable recreational space during dry periods; or
 - b. carparking and hardstand areas.
3. Detention systems sites designed as usable recreational space during dry periods will not be included as park land. Table 3.12.2.1 Design Standards for park - Minimum post development flood immunity for park of this planning scheme policy, provides suggestion on flood immunity levels for various park types.
4. Detention systems sites designed to provide usable recreation open space during dry periods shall be designed, constructed, landscaped and turfed such that:
 - a. it drains and dries rapidly after rainfall to prevent water logging or permanent ponding to maximise community benefit from the area;
 - b. public safety is maintained or enhanced by:
 - i. providing a batter slope with a maximum grade of not less than 1:6 (V:H);
 - ii. an inundation depth limit of less than 500mm and a flow depth*velocity product of less than 0.4m^2 per second;
 - iii. providing an outlet grate that allows a person to move away from the grate under all operating conditions;
 - c. it incorporates the principles of Crime Prevention Through Environmental Design (CPTED);
 - d. it includes a low flow channel or underground pipe to prevent water logging or permanent ponding to maximise community benefit from the area;
 - e. it provides pedestrian access to the basin floor to disabled grades;
 - f. it provides for vehicle access from the nearest public road into the basin for maintenance purposes.
5. Carparking space may be configured to provide stormwater detention in private development. Where this occurs, development shall ensure that:
 - a. it satisfies the requirements for carpark design and stormwater detention system design;
 - b. safety is maintained or enhanced;
 - c. flood free or low flood hazard access for the entry and exit points of the car park are provided.

3.6.7 Stormwater quality, frequent flow management and waterway stability infrastructure

3.6.7.1 Standards for stormwater quality, frequent flow management and waterway stability infrastructure

1. Except as altered by the provisions of this planning scheme policy, stormwater quality, frequent flow management and waterway stability infrastructure is designed and constructed in accordance with the most recent versions of:
 - a. the *Water by Design Water Sensitive Urban Design Technical Design Guidelines for South East Queensland*;
 - b. the *Construction and Establishment Guidelines: Swales, Bioretention Systems and Wetlands*;
 - c. the *Concept Design Guidelines for Water Sensitive Urban Design*;
 - d. Standard Drawings WSUD-001 to WSUD-012 produced by the Queensland Division of the Institute of Public Works Engineering Australia;
 - e. the MUSIC modelling guidelines for South East Queensland;
 - f. the *Deemed to Comply Solutions for Stormwater Management in South East Queensland*;
 - g. the *Water Sensitive Urban Design Asset Handover Guideline*;
 - h. Southeast Queensland Regional Plan Implementation Guideline 7 Water sensitive urban design: Design objectives for urban stormwater management (2009);
 - i. Water by Design Asset Maintenance Guidelines;
 - j. Water by Design Asset Rectification Guidelines.
2. All computer modelling undertaken for the design of stormwater quality infrastructure uses the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) software and is in accordance with the most current version of the *Water by Design MUSIC Modelling Guidelines for South East Queensland*.
3. All runoff routing computer modelling undertaken for the design of waterway stability infrastructure is in accordance with:
 - a. Water by Design's Developing Design Objectives for South East Queensland Report;
 - b. the Queensland Urban Drainage Manual;
 - c. the Australian Rainfall and Runoff;
 - d. the provisions of this section 6 - Stormwater infrastructure standards of this planning scheme policy.

3.7 Landscaping standards

3.7.1 Standards for landscaping

1. Landscaping complies with:
 - a. the standard drawings in Table 8.2.1.1 - Standard drawings for landscaping of Part 8 - Standard drawings of this planning scheme policy;
 - b. the standard specifications in Part 9 - Standard specifications of this planning scheme policy;
 - c. Austroads guidelines where non-frangible landscaping is provided.

3.7.2 Coverage of infrastructure

1. Development ensures that the minimum cover to water supply infrastructure, sewerage infrastructure and stormwater infrastructure is maintained in accordance with section 3.3.2 - Cover of infrastructure of this planning scheme policy.

3.7.3 Water sensitive urban design

1. Where water sensitive urban design principles are incorporated into the landscaping design, development is in accordance with the Water by Design Guidelines.

3.7.4 Landscaped buffers

1. Where a proposed development abuts an existing development and the planning scheme codes require the provision of landscaping; a planted buffer strip is to be used as follows:
 - a. locate and landscape a buffer strip or combination planting strip, screen fencing or earthen mound, on the abutting common boundary and within the proposed development;
 - b. locate and landscape a buffer strip to side and rear building elevations, utility structures, trade entrances, storage and disposal areas, property boundaries and areas of high noise and air pollution generation;
 - c. specify and detail species and spacing that will provide the total required screening function within 3 years of plant growth;
 - d. specify and locate district street trees to the frontage of the building;
 - e. specify and detail an in ground, automatic irrigation system and subsurface or swale drainage system to all landscaped areas and tree stations;
 - f. specify a concrete dwarf wall or, where appropriate, car stops and bollards to landscaped areas and tree stations that abut road frontages, car park aisles and bays, driveways and any other landscaped area accessible by vehicles.

3.7.5 Fencing adjoining public open space

1. Where a proposed development adjoins public open space, a fence is to be constructed on the common boundary to adjoining lots to prevent encroachment of existing or future adjoining uses into the public open space.
2. Fencing must:
 - a. contribute positively to the character of the public open space e.g. minimum 50 percent transparency metal fencing or timber paling 'good neighbour' fencing where adjacent to sports parks is generally consistent with the character of areas in the urban footprint; and timber post and rail, or timber post and wire (not barbed) fencing is generally consistent with the character of areas outside the urban footprint;
 - b. not compromise the existing or future planned use of the public open space;
 - c. not impede water flows;
 - d. not hinder general maintenance.

3.8 Electricity reticulation standards

3.8.1 Underground electricity reticulation

3.8.1.1 Circumstances where underground electricity reticulation is required

1. Underground electricity reticulation is provided to every new registered lot unless otherwise specified in section 3.8.2 - Electricity reticulation - overhead of this planning scheme policy.

3.8.1.2 Designing the underground infrastructure network

1. Underground electricity reticulation complies with Energex Subdivision Standards and Specification Underground Distribution and Construction.
2. A shared trench for an electrical conduit is not provided with another service unless it is:
 - a. for a telecommunication service or for a service of the Department of Transport and Main Roads;
 - b. at a road crossing.
3. An electrical conduit at a road crossing is:
 - a. at a right angle to the road boundary; or
 - b. at an angle of up to 45° to the road boundary, where the road crossing is directly between electrical service pillars on both sides of a road.
4. A road crossing for an electrical conduit within an area defined as an intersection under the Transport Operations (Road Use Management - Road Rules) Regulation 1999, is provided on a standard electricity reticulation alignment of 0.3 metres from a projection of the lot boundary.
5. A road crossing for an electrical service pillar conduit is provided at the opposite boundary to a road crossing for a water service conduit unless the road crossing for the:
 - a. electrical conduit is at an angle of 45°;
 - b. water service conduit is perpendicular.
6. An electrical service pillar:
 - a. is not located on a truncated boundary;
 - b. is located at the:
 - i. vehicular entry point to the premises; or
 - ii. side boundary of the premises where on an alternate boundary to a hydrant or water service connection; or
 - iii. tangent point of a marked boundary; or
 - iv. entry points to a park.
7. An 11kV entry point to an internal transformer provides a "cabmark" cable marker post approved by the electricity provider at the entry point to the premises.
8. An overhead to an underground cable crosses the verge at right angles to an electrical service pillar of a "cabmark" post in accordance with the electricity provider's standard drawing.

3.8.1.3 Transformers

1. A new transformer is pad mounted (PMT).
2. A pad mounted transformer is located in the road reserve.
3. A pad mounted transformer in road reserve adjacent to a park provides:
 - a. a screen fence with a minimum height of two metres erected on the boundary of the road adjacent to the park to minimise any negative impacts on visual amenity of the park and road frontage;
 - b. landscaping, maintained by the electricity provider, adjoining the fence and within the park.
4. The upgrading of an existing pole transformer (PT) occurs only where the replacement pole is at the same location.
5. An existing pole mounted transformer is replaced by a new pole mounted transformer only:
 - a. where there is no additional pole provided;
 - b. where there is no extension to the overhead electricity reticulation;
 - c. for a development of up to five lots where those lots are provided with underground reticulation.

3.8.2 Electricity reticulation - overhead

3.8.2.1 Circumstances where overhead electricity reticulation is provided

1. Overhead electricity reticulation may be provided in the:
 - a. Environmental management and conservation zone;
 - b. Rural residential zone;
 - c. Rural zone;
 - d. in the urban footprint as identified in Figure 3.1 - Strategic Intent of Part 3 - Strategic framework of the planning scheme as a temporary installation to service the balance area of a development where further development, being a reconfiguring of a lot, is possible and underground electrical reticulation supply can be readily obtained in a further development permit.

3.8.3 Electrical service connection

3.8.3.1 Underground electricity service connection

1. An underground electricity service connection is provided unless specified in section 3.8.3.2(1) of this planning scheme policy.

3.8.3.2 Circumstances where overhead electricity service connection may be provided

1. Overhead electricity service connection may be provided:
 - a. in an urban residential zone where:
 - i. there is existing overhead electricity reticulation;
 - ii. it does not involve a new road;
 - iii. it does not involve a property pole, a cross street service pole or a flying fox overhead property connection;
 - b. in a rural or rural residential zone where:
 - i. there is existing overhead electricity reticulation;
 - ii. it does not involve a new road.
 - c. in a rural or rural residential zone where new rear lots are created, providing the access handle has a minimum width of 20 metres.
2. Where a new road is created, an underground electricity service connection is provided to all new lots with frontage to the new road.

3.8.3.3 Designing the overhead service connection

1. An overhead electricity service connection does not result in a connection that crosses:
 - a. premises other than the premises being serviced; or
 - b. the road; except in section 3.8.3.2(1) of this planning scheme policy.
2. Where an overhead electricity reticulation pole already services the new premises and is intended to be retained for wider reticulation purposes, development provides an electrical conduit:
 - a. where the new premises is located on the same side of the road as the electricity reticulation pole:
 - i. at right angles across the verge to the underground power reticulation alignment, and then parallel to and adjacent the road reserve boundary up to the pillar into the premises being serviced, where the electricity reticulation pole is located within the frontage of the new premises; or
 - ii. at right angles across the verge from the electricity reticulation pole to the underground electricity alignment, and then parallel to and adjacent the road reserve boundary up to the pillar into the premises being serviced, where the electricity reticulation pole is not located within the frontage of the new premises;
 - b. where the new premises is located on the opposite side of the road as the electricity reticulation pole, at right angles across the road from the electricity reticulation pole to the underground electricity alignment (with kerb markers at the appropriate locations on both sides of the road crossing), and then parallel to and adjacent the road reserve boundary up to the pillar into the premises being serviced;
- c. by thrust boring under the existing road unless approved otherwise.

3.9 Gas and telecommunication reticulation standards

1. Gas and telecommunication services are in accordance with the service provider's requirements.
2. Unless otherwise stipulated by telecommunications legislation at the time of construction, developments must be provided with all necessary conduits, pits and pipes to accommodate the future connection of optic fibre technology telecommunications.

3.9.1 Service trenches

1. Trenches are excavated so that conduits can be laid with a 75mm clearance all around.
2. The bottom of a trench:
 - a. is firm and smooth;
 - b. is level or where there is a change in level from the footpath to the roadway or an embankment, the change is gradual.
3. Conduits shall be bedded for 120 degrees of their circumference on at least 75mm of compacted sand or trench backfill material as approved by the local government.
4. Trenches across roadways and pavement areas:
 - a. are excavated before pavement material has been placed;
 - b. along footpaths, are excavated before topsoiling and grassing has been carried out;
 - c. comply with standard drawings in Table 8.1.1.1 - Standard drawings for movement infrastructure of Part 8 - Standard drawings of this planning scheme policy.
5. The alignments and nominal depths for each utility shall be specified with minimum separation distances.

3.9.2 Coverage of infrastructure

1. The minimum cover to water supply infrastructure, sewerage infrastructure and stormwater infrastructure is maintained in accordance with section 3.3.2 - Cover of infrastructure of this planning scheme policy.

3.9.3 Maintenance structures (access chambers)

1. Where filling has occurred over existing infrastructure:
 - a. maintenance structures are:
 - i. extended to the new surface level; or
 - ii. reconstructed to the new surface level;
 - b. filling adjacent to maintenance structures is retained and shaped to allow access to the maintenance structure where the area around the maintenance structure is self-draining.

3.9.4 Conduits

1. All PVC pipe conduits, joints and couplings comply with:
 - a. AS/NZS 1477:2006 and Amdt 1:2009 PVC pipes and fittings for pressure applications;
 - b. AS/NZS 2053.1:2001 Conduits and fittings for electrical installations-general requirements;
 - c. AS 2439.1-2007 Perforated plastics drainage and effluent pipe and fittings-perforated drainage and associated fittings.
2. Brass marker discs are supplied and installed in accordance with the standard drawings in Table 8.1.1.1 - Standard drawings for movement infrastructure of Part 8 - Standard drawings of this planning scheme policy.
3. Where there is no kerb and channel, concrete marker blocks are constructed in accordance with the standard drawings in Table 8.1.1.1 - Standard drawings for movement infrastructure of Part 8 - Standard drawings of this planning scheme policy and the following:
 - a. using grade N25 concrete;
 - b. 225mm x 75mm x 450mm long;
 - c. with indentation for the indicator disc centrally placed on the top face of each block.

3.10 Water supply infrastructure standards

1. Water supply infrastructure is to be designed and constructed in accordance with the *South East Queensland - Water Supply and Sewerage Design and Construction Code*.

3.11 Sewerage infrastructure standards

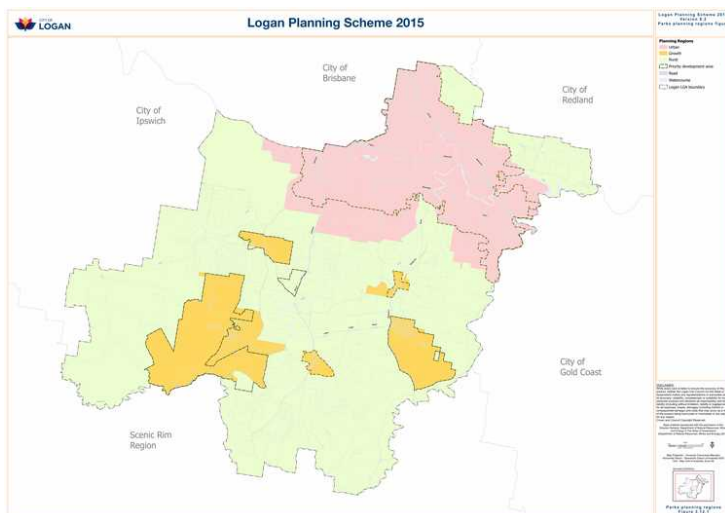
1. Sewerage infrastructure is to be designed and constructed in accordance with the *South East Queensland - Water Supply and Sewerage Design and Construction Code*.

3.12 Parks infrastructure standards

3.12.1 Planning the parks network

1. The parks network is planned in accordance with Part 4 - Local government infrastructure plan (section 4.4.5 - Parks network) of the planning scheme. The urban, growth and rural planning regions of the parks network are identified on Figure 3.12.1.

Figure 3.12.1 - Parks planning regions



3.12.2 Standards for parks

1. Parks infrastructure is provided in accordance with Table 3.12.2.1 - Design standards for parks of this planning scheme policy.

Table 3.12.2.1 - Design standards for parks

Column 1 Design standards	Column 2 Park classification						
	Recreation Park					Sport Park	
	Local	District	Metropolitan	Civic	Corridor	District	Metropolitan
Provision (ha/1000p)	0.9 0.0 for Rural (no Local Park in rural planning region)	0.9	0.6	NA (part of Local Recreation Park provision)	NA	0.9	0.6
Accessibility	500m catchment (90% of population) and not within 600m of other Recreation Parks	1.5km catchment (90% of population) and not within 2.0km of other District or Metropolitan Recreation Park	5km catchment and not within 7.5km of other Metropolitan Recreation Park	Located adjacent to town centre	NA	2.0km catchment (90% of population) and not within 2.5km of other Sport Parks	City-wide
Size Minimum (ha)	1.0	5.0	15.0	0.2	NA	10.0	15.0
Road Frontage	> 50 %	> 50 %	> 40%	> 50% and Integrated with premises with an active frontage	> 70% with a maximum distance between road frontages of 80m	> 50 %	> 25%
Shape	Compact shape free of irregular boundaries sufficient to accommodate the required Activity and Kick-about Space Functional Areas Minimum width 20m	Compact shape free of irregular boundaries sufficient to accommodate the required Activity and Kick-about Space Functional Areas Minimum width 20m	Compact shape free of irregular boundaries sufficient to accommodate the required Activity and Kick-about Space Functional Areas Minimum width 20m	Square or rectangular and sufficient space to accommodate the required Activity Areas and Community Facility	Minimum width of 15m	Compact shape free of irregular boundaries sufficient to accommodate the required Activity and Playing Field Functional Areas	Compact shape free of irregular boundaries sufficient to accommodate the required Activity and Playing Field Functional Areas
Activity Area(s) This area provides embellishments that offer the community a diversity of recreational opportunities.	1-2 20% of park or absolute minimum of 0.2ha area irrespective of total park area - whichever is the greater including interface with surroundings	3-4 10% of park or absolute minimum of 0.5ha area irrespective of total park area - whichever is the greater including interface with surroundings	4-8 10% of park or absolute minimum of 1.0ha area irrespective of total park area - whichever is the greater including interface with surroundings	1 100% of park	NA	1-2 Minimum 10% park or absolute minimum of 1ha - whichever is the greater (for clubhouse, amenities and Local Recreation Park Activity Area)	2 Minimum 15% of park or absolute minimum of 2.0ha - whichever is the greater (for clubhouse, amenities and Local Recreation Park Activity Area)
Kick-about Space (for Recreation Park) / Playing Field(s) (for Sport Park) (Open grassed area for informal and formal ball sports)	Kick-about Space = 1 to 2 40% of park (absolute minimum 0.4ha min) including interface and batters with surroundings Broadly, square, round or rectangular 30m x 50m minimum excluding batters (can have multiple kick-about spaces of this dimension)	Kick-about Spaces = 2 to 4 25% of park (absolute minimum 1.2ha min) Broadly, square, round or rectangular 30m x 50m minimum excluding batters (can have multiple kick-about spaces of this dimension)	Kick-about Spaces = 4 to 6 25% of park (absolute minimum 2.5ha min) Broadly, square, round or rectangular 30m x 50m minimum excluding batters (can have multiple kick-about spaces of this dimension)	NA	NA	Playing Fields At least 2 full-size playing fields in north south orientation with full overflow areas and associated spectator areas Area will depend on topography and layout. Absolute minimum of 7ha	Playing Fields At least 3 full-size, multi-purpose playing fields and 6 courts in a north south orientation with full overflow areas and associated spectator areas Area will depend on topography and layout. Absolute minimum of 10ha
Slope/ Grade	1 in 40 for Activity Area and Kick-about Space Retain natural topography where possible and maximise flat areas			1 in 40 max	1 in 10 max 1 in 6 maximum for grass areas	Playing surface to be laser levels to maximum grade of 1 in 70 1 in 6 maximum for grass areas	

Column 1 Design standards	Column 2 Park classification						
	Recreation Park					Sport Park	
	Local	District	Metropolitan	Civic	Corridor	District	Metropolitan
	1 in 6 maximum for turf 1 in 4 maximum for vegetated garden beds / batters No walls (Note: Local government may consider small walls provided the walls are small, safe and integrated broader landscape) 1 in 6 maximum turf batters, 1 in 4 maximum for planted batters				1 in 4 maximum for planting areas	1 in 4 maximum for planting areas	
Flood Immunity	Activity Area > 100 year ARI Remainder of park >20 year ARI Where a Community Facility is included in the park, the area above the 100year ARI must increase to include both the Community Facility and Activity Area.			>100 year ARI	>20 year ARI	Provided minimum park size is achieved (refer above) the following applies: · 100% above 10 year ARI · 50% above 50 year ARI (including artificial playing surfaces) · 10% above 100 year ARI Where park size is smaller than the minimum park size (refer above) then the area of higher level of flood immunity applies Where a Community Facility is included in the park, the area above the 100year ARI must increase to greater than a minimum 10% include both the Community Facility and Sporting functions	
CPTED	Clear and visible lines of sight from formalised park entries and pedestrian crossing Provides casual surveillance to and from the park Refer Planning scheme policy 1 - CPTED						

3.12.3 Typical embellishments for recreation park

- Embellishments for recreation park are listed in Table 3.12.3.1 - Typical embellishments for recreation park of this planning scheme policy.

Table 3.12.3.1 - Typical embellishments for recreation park

Column 1 Embellishment Type	Column 2 Functional Zone			Column 3 Recreation Park				
	Activity Node	Kick-about Space / Playing Field(s)	Natural Area	Local	District	Metropolitan	Corridor	Local - Civic
Artwork	✓			Site specific on merit	Yes	Yes	Site specific on merit	Yes
BBQ	✓			Site specific on merit	3 x units co-located with covered seating and tables	8 x units co-located with covered seating and tables	No	No
Bins	✓	✓		2 units co-located with picnic facilities	6 units co-located with covered seating and tables	20 units co-located with covered seating and tables	1 units every 3km located at entry/exit point	2 units
Ceremonial Space	✓		✓	No	Site specific on merit	Site specific on merit	No	Yes
Community Facility	✓			No	Yes at discretion of Council and provided additional area is provided above 100yr ARI for Recreation Park Activity Area as well (refer Community Infrastructure DSS)	Yes at discretion of Council and provided additional area is provided above 100yr ARI for Recreation Park Activity Area as well (refer Community Infrastructure DSS)	No	Adjacent at discretion of Council (refer Community Infrastructure DSS)
Covered seating and table	✓			2 x Setting to cater for small gathering	4 x Setting to cater for small gathering and 1 x setting to cater for larger gathering	8 x Setting to cater for small gathering and 4 x setting to cater for larger gathering	Setting based on site specific merit	Site specific on merit
Dog-Off Leash	✓			No	1 x large dog off leash area at 800m ² and 1 x Small dog off leash area at 600m ²	2 x large dog off leash area at 800m ² and 1 x small dog off leash area at 600m ²	No	No
Drainage (Sub-surface)		✓		Kick-about (if below 10yr ARI)	Kick-about (if below 10yr ARI)	Kick-about (if below 10yr ARI)	Site specific	Site Specific
Drinking Fountain and hose cock	✓	✓		1 unit	6 units	8 units	1 unit per 3km	2 units
Fencing / Bollards / Locking rails	✓	✓	✓	Yes, to road reserve	Yes, to road reserve	Yes, to road reserve	Yes, to road reserve	Site specific on merit
Field / Court Lighting		✓		No	No	No	No	No
Fitness Equipment	✓	✓		3 items that cater for a range of users	6 items that cater for a range of users	12 items that cater for a range of users	Yes	No
Goal posts / line marking		✓		No	No	No	No	No
Internal roads	✓		✓	No	Yes	Yes	No	No
Interpretive Signage	✓		✓	Yes	Yes	Yes	Yes	Site specific on merit
Irrigation		✓		No	Site specific on merit	Site specific on merit	No	Site specific on merit
Lighting (Safety)	✓			Site specific on merit	Site specific on merit	Site specific on merit	Site specific on merit	Site specific on merit
Maintenance access	✓	✓	✓	Yes	Yes	Yes	Yes	Yes

Column 1 Embellishment Type	Column 2 Functional Zone			Column 3 Recreation Park				
	Activity Node	Kick- about Space / Playing Field(s)	Natural Area	Local	District	Metropolitan	Corridor	Local - Civic
Multi- purpose / hard court sports	✓	✓		1 x half basketball court	1 x Multiple-use court	3 x Multiple-use court	No	No
Parking		✓		Kerbside parking	40 off street parking bays that meet relevant Australian standard	120 off street parking bays that meet relevant Australian standard including bus parking and turnaround or pull through	No	2 x emergency services car parks and Kerbside Parking
Pathways, cycle ways and trails Refer PSP	✓	✓	✓	Combination of pedestrian and shared use pathways to connect activity nodes	Combination of pedestrian and shared use pathways to connect activity nodes	Combination of pedestrian and shared use pathways to connect activity nodes	Shared use pathway designed in accordance with relevant standards and guidelines	Site specific
Platforms and Pontoons			✓	No	Site specific on merit	Site specific on merit	Site specific on merit	No
Playground	✓			Minimum 300m ² of softfall footprint and play equipment	Minimum 450m ² of softfall footprint and play equipment that cater for ages 1 to 17 years	Minimum 600m ² of softfall footprint and play equipment that cater for ages 1 to 17 years	No	Site specific on merit
Scoreboard		✓		No	No	No	No	No
Seating	✓	✓	✓	3 x units	6 x units	15 x units	Site specific	Site specific with consideration to future event programming
Shading	✓		✓	Tree canopy at maturity to achieve a minimum 30% shade coverage	Tree canopy at maturity to achieve a minimum 30% shade coverage	Tree canopy at maturity to achieve a minimum 30% shade coverage	Tree canopy at maturity to achieve a minimum 30% shade coverage No clearing of native vegetation	Site specific with consideration to future event programming
Skate Park / BMX	✓			No	1 x catering for a range of skill levels. Approximate size to be a min. 400m ²	1 x catering for a range of skill levels. Approximate size to be a min. 600m ²	NA	No
Sports Club Facility		✓		No	No	No	No	No
Toilets	✓			No	1 facility (Facility = 3 cubicle unisex: 1 standard, 1 ambulant, 1 disabled)	2 facilities (Facility = 3 cubicle unisex: 1 standard, 1 ambulant, 1 disabled)	No	Yes with consideration to future event programming

3.12.4 Typical embellishments for sport park

- The embellishments for sport park are listed in Table 3.12.4.1 - Typical embellishments for sport park of this planning scheme policy.

Table 3.12.4.1 - Typical embellishments for sport park

Column 1 Embellishment Type	Column 2 Functional Zone			Column 3 Sport Park	
	Activity Node	Kick-about Space / Playing Field(s)	Natural Area	District	Metropolitan
Artwork	✓			Site specific on merit	Site specific on merit
BBQ	✓			No	3 x units
Bins	✓	✓		6 units	12 units
Ceremonial Space	✓		✓	No	No
Community Facility	✓			Yes at discretion of Council and provided additional area is provided above 100yr ARI for Recreation Park Activity Area as well (refer Community Infrastructure DSS)	Yes at discretion of Council (refer Community Infrastructure DSS)
Covered seating and table	✓			3 x Setting to cater for small gathering and 1 x setting to cater for larger gathering	5 x setting to cater for larger gathering and 3 x setting to cater for larger gathering
Dog-Off Leash	✓			No	No
Drainage (Sub- surface)		✓		Field	Field
Drinking Fountain and hose cock	✓	✓		6 units	25 units
Fencing / Bollards / Locking rails	✓	✓	✓	Yes	Yes
Field / Court Lighting		✓		Yes, Fields The standard of lighting to be provided at sport parks will be commensurate with the level of use, standard of completion and flood immunity. Where necessary the lighting of premium fields will be to a national competition standard.	Yes, Fields and courts The standard of lighting to be provided at sport parks will be commensurate with the level of use, standard of completion and flood immunity. Where necessary the lighting of premium fields will be to a national competition standard.

Column 1 Embellishment Type	Column 2 Functional Zone			Column 3 Sport Park	
	Activity Node	Kick-about Space / Playing Field(s)	Natural Area	District	Metropolitan
Fitness Equipment	✓	✓		6 items that cater for a range of users	12 items that cater for a range of users
Goal posts / line marking		✓		Yes	Yes
Internal roads	✓		✓	Yes	Yes
Interpretive Signage	✓		✓	No	No
Irrigation		✓		Irrigation with subsurface drainage	Irrigation with subsurface drainage
Lighting (Safety)	✓			Site specific on merit	Site specific on merit
Maintenance access	✓	✓	✓	Yes	Yes
Multi-purpose / hard court sports	✓	✓		Site specific as required	Site specific as required with a north-south orientation
Parking		✓		80 off street parking bays that meet relevant Australian standard including bus parking and turnaround or pull through	400 off street parking bays that meet relevant Australian standard including bus parking and turnaround or pull through
Pathways, cycle ways and trails Refer PSP	✓	✓	✓	Combination of pedestrian and shared use pathways to connect activity nodes	Combination of pedestrian and shared use pathways to connect activity nodes
Platforms and Pontoons			✓	No	No
Playground	✓			Minimum 300m ² of softfall footprint and play equipment	Minimum 450m ² of softfall footprint and play equipment that cater for ages 1 to 17 years
Scoreboard		✓		2 units	3 units
Seating	✓	✓	✓	20 units The standard of spectator seating to be provided will be commensurate with the level of demand and standard of competition. Sufficient spectator seating will be provided where required to cater for a regional level sporting completion.	100 units and grandstand seating
Shading	✓		✓	Tree canopy at maturity to achieve a minimum 30% shade coverage to spectator seating	Tree canopy at maturity to achieve a minimum 30% shade coverage to spectator seating
Skate Park / BMX	✓			1 x catering for a range of skill levels. Approximate size to be a min. 400m ²	1 x catering for a range of skill levels. Approximate size to be min. 600m ²
Sports Club Facility		✓		Yes	Yes
Toilets	✓			1 facility (Facility = 3 cubicle unisex: 1 standard, 1 ambulant, 1 disabled)	2 facilities (Facility = 3 cubicle unisex: 1 standard, 1 ambulant, 1 disabled)