



CITY OF COCKBURN

GUIDELINES AND STANDARDS

**for the Design, Construction and Handover of
Subdivision within the Municipality**

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INTRODUCTION

This document has been compiled to assist development consultants to meet the expectations of the City of Cockburn in the development of residential and industrial subdivisions. The intention is not to supplant other texts on subdivisional development but to provide detail to what are generally given as broad statements.

The City of Cockburn is the authority responsible for the future care, control and management of the road, POS and stormwater drainage infrastructure constructed to enable the subdivision of land. The City therefore retains the right to require a subdivision to be constructed to the standards detailed hereunder and to its entire satisfaction.

The Design Engineer is responsible for compliance with this document, associated publications and statutory requirements. Council's acceptance of a design submission shall not relieve the Design Engineer of this responsibility or the responsibility for any discrepancies, errors or omissions in the submission or from the adequacy of the design.

The City acknowledges that the Local Government Guidelines for Subdivisional Developments, Edition 2.3, 2017 (as amended) published by IPWEA are to be considered as the minimum standard for subdivision development and are to be read in conjunction with this document and other policies and legislations relevant to Agencies associated with subdivisional approvals.

All designs submitted for approval will be checked against these guidelines and those found wanting will be returned for revision. This is not to imply innovation will not be considered, but good supportive evidence must accompany any proposal. As this is a living document and subject to changes, positive, constructive criticism is welcome.

1.0 Stormwater Drainage

1.1 General

- 1.1.1 Designers must develop and submit on a plan a drainage strategy for the whole of the catchment. The plan must include groundwater contours if they will affect the design.
- 1.1.2 The stormwater drainage system is to be designed in accordance with the manual 'Australian Rainfall and Runoff, 1987' and the overland flow path is to be shown on the catchment plan required in section 1.1.1 above.
- 1.1.3 The major system is to be designed so that the floor levels of all habitable buildings are a minimum of 300mm above the 100-year ARI storm flood level.
- 1.1.4 Storm drainage management reports for various areas are available on Council's website.

1.2 Design

- 1.2.1 Design calculations are to be submitted with the design drawings.
- 1.2.2 Design average recurrence intervals shall be:-
 - 10 years for commercial/industrial area minor drainage
 - 5 years for residential minor drainage.
- 1.2.3 Coefficients of runoff from sandy soils shall be: -
 - Road reserves 0.9
 - Coefficients of runoff not covered above should be calculated in accordance with Section 14.5 of AR&R 1987
 - For catchments greater than 15ha methods other than the Rational Method are to be used for calculating flows.
- 1.2.4 Time of concentration: – min. 6 minutes.
- 1.2.5 The minimum pipe velocity should be sufficient to sustain self-cleaning.
- 1.2.6 Minimum permissible pipe size is 225mm diameter.
- 1.2.7 Longitudinal pipelines shall not be placed under road pavements except to serve an inlet pit in the opposing gutter.
- 1.2.8 All stormwater drainage pipes shall be of reinforced concrete. The City Engineer may approve alternate materials if convincing supporting data is provided.

- 1.2.9 The maximum water level (hydraulic grade line) in an inlet pit shall be limited to 150mm below the inlet and to 150mm below the underside of a junction pit lid.
- 1.2.10 Inlet pits shall match the kerbing with the front of the lid on the kerb face line (not indented) and shall be bicycle friendly (without deflector flutes).
- 1.2.11 Minimum cover over pipes shall be 600mm for class 2 pipes and 400 mm for class 4 unless otherwise specified by the manufacturer.
- 1.2.12 Pipe alignments in the verge shall conform to the “Utility Providers Code of Practice WA”.
- 1.2.13 In areas where the base of a pit is above the AAMGL by a minimum of 500mm the base shall be 600mm below the lowest pipe invert level and the seep hole in the base shall be 600mm diameter to aid infiltration. The base will be laid on a 300mm depth of 20mm granite aggregate wrapped in geotextile. The seep hole is to be filled with loose 20mm granite aggregate.
- 1.2.14 When the base is less than 500mm above AAMGL pits are to be benched (chased).
- 1.2.15 Pipes shall be sized disregarding any possible infiltration volume as described in 1.2.13 above but the storage between pipe invert and the base may be considered.

1.3 Layout

- 1.3.1 Inlet pits shall be placed immediately upstream of all intersections where the catchment > 150m².
- 1.3.2 Inlet and junction pits should be placed mid-block to avoid future clashes with driveways, etc.
- 1.3.3 Inlet pits should be placed to limit gutter flow to a maximum of 1.5m width or to limit the volume to the inlet capacity of the inlet pit, whichever is the least.
- 1.3.4 The maximum spacing of inlet pits irrespective of gutter flows shall be 100m on a crowned cross-section and 60m on a road with one-way crossfall.
- 1.3.5 All drainage lines to be placed under existing roads are to be bored.
- 1.3.6 Junction pits are to be placed clear of the carriageway.

- 1.3.7 Every effort is to be made to keep all junction pit structures clear of the road pavement.
- 1.3.8 Combination pits shall be placed at all “trapped” low points.

1.4 Subsoil Drainage

- 1.4.1 Finished lot levels are to be a minimum of 1.2m above the predevelopment AAMGL.
- 1.4.2 If the land is to be filled then subsoil drainage is to be placed to maintain the AAMGL at its pre-development level. The predevelopment AAMGL is not to be lowered.
- 1.4.3 Soil permeability tests are to be taken on site and used to determine the spacing of subsoil drainage lines. Data from such tests and the calculations are to be submitted.

Compensating Basins and Sumps

- 1.4.4 Council’s philosophy is to maximise localised recharge of the ground water.
- 1.4.5 Lined basins (ornamental lakes) are prohibited for use as drainage basins.
- 1.4.6 Drainage detention basins are to be placed at the lowest point of the catchment and are to be designed to take the total catchment runoff from a critical storm event.
- 1.4.7 Compensating basins are to be placed in the catchment when the pipe size becomes greater than 1050mm dia. or the depth to invert greater than 3m.
- 1.4.8 An open basin (or grassed swale) shall have batters not exceeding a 1 in 7 slope over a maximum distance of 50m.
- 1.4.9 Open basins shall be landscaped compatible with passive recreation except where the conservation value of the natural vegetation is high.
- 1.4.10 The last Junction pit in the road reserve before the outlet into an open drainage basin shall be fitted with a gross pollution trap.
- 1.4.11 To maximise infiltration the compensating basin capacity shall be sufficient to accommodate a 1 in 10 ARI storm below the outlet invert.
- 1.4.12 Infiltration rates shall be determined by site testing and due consideration shall be given to the AAMGL for the area. Test results and calculations are to be submitted with the overall drainage

calculations.

- 1.4.13 Prior to adopting an infiltration rate consideration should be given to the effect of sedimentation over time. Information on the adopted rate, including its source, should be submitted with the design.
- 1.4.14 Where acceptable batter slopes are not possible, a fenced basin shall be installed.
- 1.4.15 In a fenced basin, the batter slope shall be the natural angle of repose but shall not exceed 1 in 2.
- 1.4.16 For stand-alone basins, fencing shall be a minimum height of 1800mm and can be constructed of masonry seated colourbond metal, supersix fibro-cement (capped and painted both sides), brick or masonry. Piers shall be provided for all types of fencing and shall be no more than 300mm above the fence line and be at no greater than 7.5m centres for brick and masonry and 6m for all other fences. For basins incorporated in passive recreation areas the fencing shall be acceptable to Council's Parks Manager.
- 1.4.17 The basin shall be provided with a matching lockable, theft proof gate, a concrete crossover and a constructed ramp of 150mm compacted limestone to the base.
- 1.4.18 It shall be planted with suitable native trees and shrubs between the fence and the design top water level.

2.0 Earthworks and Site Regrading

2.1 Earthworks and site regrading shall be undertaken to: -

- 2.1.1 Prevent the flooding of low-lying areas.
- 2.1.2 Provide an overland flow path for major storm events.
- 2.1.3 Regrade slopes to facilitate the proposed development.
- 2.1.4 To provide adequate cover over stormwater drainage pipes as recommended by the manufacturers.
- 2.1.5 To provide the required freeboard for major storm events.
- 2.1.6 The protection of significant site features.

2.2 Design Requirements

- 2.2.1 The plan must show existing and proposed contours.
- 2.2.2 Measures to protect the existing environment are to be detailed and to be supplied to the City by digital means.
- 2.2.3 Any trees proposed for removal are to be clearly shown.
- 2.2.4 Topsoil is to be removed stockpiled and respread at completion of works.
- 2.2.5 The proposed stabilisation details are to be shown on the plan.
- 2.2.6 A dust management plan, including the protection of surrounding properties, is to be submitted for approval with the earthwork drawings.
- 2.2.7 Finished lot levels are to be no less than 1.2m above the AAMGL or the control ground water level as the case may be.

2.3 Guidelines

- 2.3.1 Prior to placing fill material, existing ground conditions are to be investigated by a Geotechnical Engineer, as a minimum by mechanical intrusion, and any material unsuitable for purpose is to be mapped and then removed (All details to be supplied to the City by digital means).
- 2.3.2 Fill material is to be clean, free draining, sand, free from large rocks, stumps, organic matter and other deleterious debris. Not less than 35% of the material by weight shall pass the 4.75mm sieve and not more than 5% by weight shall pass the 75-micron sieve. The plasticity of the material passing the 435-micron sieve shall not exceed 6.

- 2.3.3 Fill material is to be prevented from spilling over onto surrounding properties.
- 2.3.4 The fill material shall be placed in layers no thicker than 300mm and each layer shall be compacted to 95% standard dry density when measured with a calibrated penetrometer. (All details to be supplied to the City by digital means).
- 2.3.5 Stockpile areas are to be treated with erosion and dust control measures.
- 2.3.6 Retaining walls are to be designed and certified by a practicing structural engineer and signed detail drawings are to be submitted for Council's records.
- 2.3.7 The design engineer is to provide a certificate with supporting documentation and test results signed by a professional Geotechnical Engineer confirming that the land to be released is suitable for its intended purpose.

3.0 Road design and layout

3.1 General design criteria

3.1.1 Minimum road reserve width for residential streets is 15m except roads abutting POS road reserve width can be reduced to 13.5m (reduced verge width on POS side).

3.1.2 Pavement widths are to conform to the standards set out in the document “Liveable Neighbourhoods” dated June 2000 or as amended except that the minimum carriageway width shall be 5.5m and the minimum intersection kerb radii shall be 12m to accommodate a “Design Single Unit Truck”.

3.1.3 Cycle ways shall be as required by “Bikeplan”

3.2 Road pavements

3.2.1 The road pavement profiles shall be in accordance with IPWEA (Institute of Public Works Engineering Australia) Policy note “Pavement Profiles in Residential Streets” which is as below:

- 200mm average compacted thickness limestone.
- 40mm average compacted thickness 10mm or 14mm dense graded asphalt designed to 35 Marshall blows with a final surface of 25mm average compacted thickness of 7mm dense graded or gap graded asphalt designed to 35 Marshall blows for roads with design traffic less than 5E 5 ESA's

OR

- 35mm or 40mm average compacted thickness 10mm or 14mm dense graded asphalt designed to 35 Marshall blows with a final surface of 30mm of 10mm dense graded asphalt designed to 50 Marshall blows for roads with design traffic greater than 5 E5 ESA's but less than 1.0 E6 ESA's.

Notes:

- *This pavement depth is recommended only in residential streets with sand sub-grades with a minimum depth of 1m to the maximum water table level.*
- *In the case of soils containing silts, clays, peat or in cases closer than 1m to the maximum water table, specific pavement designs should be undertaken in line with Standards Australia/Austroads Pavement Design Manual or APRG Report No 21, A guide to the design of new pavements for light traffic as applicable.*
- *Where the road carries traffic greater than 1×10^6 equivalent standard axles over a 20 year design life, the pavement profile should be subject to specific design.*

3.2.2 Road pavements are to be of the materials specified above. Brick paving and concrete beams are not allowed in road pavements, but are allowed in the following area; breaks in median islands, as infill in median and splinter islands and in parking nodes. All bricks are to be of an interlocking type and laid on a maximum 30mm sand bedding. Joint

infill sand shall be Pave-Lok or similar used to the supplier's specification. Differential settlement between the road pavement, the concrete beam and the paving bricks are to be addressed and nullified.

Red asphalt shall consist of 2% red oxide in a granite mix.

3.2.3 Compaction requirements:

Sub-grade = Sub-grade shall be compacted to not less than 95% of the maximum dry density obtained in the modified maximum dry density compaction tests in accordance with AS 1289.5.2.12003 to a min depth of 600mm below bottom of box levels

Limestone = Sub-base shall be compacted to not less than 95% of the maximum dry density obtained in the modified maximum dry density compaction tests in accordance with AS 1289.5.2.12003

Asphalt

Asphalt shall be compacted to the following average in situ air voids:-

Asphalt Mix Type	Average in situ air voids
35 blow mixes & gap graded mixes	2.5 to 8.0% (surface layers)
	2.5 to 7.0% (in bottom layers)
50 blow mixes	3.0 to 10.0% (in bottom layers)

3.2.4 Thickness Tolerance:

The average asphalt thickness of cores taken from the asphalt surfacing shall be within + or – 10% of the specified asphalt thickness.

Property	Mix Designation		
	AC7	AC10	AC14
	20 to 30mm thick	30 to 55mm thick	40 to 60mm thick
Grading Limits % passing AS Sieve			
26.5mm			
19.0mm			100
13.2mm		100	90 - 100
9.5mm	100	90 - 100	70 - 90
6.7mm	80 - 100	80 - 95	62 - 75
4.75mm	70 - 90	65 - 80	47 - 67
2.36mm	45 - 60	45 - 60	34 - 52
1.18µm	35 - 50	35 - 50	25 - 41
600µm	22 - 35	25 - 40	16 - 32
300µm	14 - 25	15 - 25	9 - 21

150µm		8 - 16	7 - 15	5 - 13
75µm		5 - 8	3 - 10	2 - 8
Bitumen Content		5.0 - 7.0	4.5 – 6.5	4.5 - 6.5
Marshall Voids (%)	35 blows	2.0 - 3.5	2.0 - 3.5	2.0 - 3.5
	50 blows	3.0 - 5.0	3.0 - 5.0	3.0 - 5.0
Minimum Marshall	35 blows	4.0 kN	4.0 kN	5.5 KN
	50 blows	5.5 kN	6.5 kN	6.5 kN
Marshall Flow (mm)	35 blows	2.0 - 5.0	2.0 - 5.0	2.0 - 5.0
	50 blows	2.0 - 4.0	2.0 - 4.0	2.0 - 4.0
Marshall Quotient (min)	35 blows	1.0	1.0	1.0
	50 blows	1.7	1.7	1.7

Recommendations for 20 year design traffic

Range/Type	Mix	Bitumen Type
Greater than 500,000 ESA	Use distributor mix	
Greater than 50,000 ESA	50 blows	Class 170
Less than 50,000 ESA	35 blows	Class 170
Maintenance	50 blows	Class 170

3.3 Gradients

Minimum longitudinal gradient – 0.5%

Turning circles in cul-de-sacs – less than or equal to 5%

Through intersections – where practical less than or equal to 4%

Absolute maximum longitudinal gradients:

Access Place/Way – 16%

Local distributor - 12%

District distributor – 8%

3.4 Vertical curves

Vertical curves shall be placed at all grade changes exceeding 1%.

Minimum lengths: -

	General	At intersections
Access Place/Way	25m	6m
Local Distributor	35m	12m
District Distributor	50m	20m

3.5 Horizontal Curves

Horizontal curve dimensions are given as centreline measurements.

Design Speed	Curve – no tangents Min. Radii	Curve – with tangents Min. Radii
20	15m	10m
30	30m	20m
40	90m	40m
50	120m	60m
60	150m	80m

3.6 Crossfalls

- Crossfalls should be generally 3% either side of the crown
- One way crossfalls are acceptable in Access Place/Ways but around curves superelevation shall apply, with fall to the centre of the curve
- Cross falls may be varied at low points to ensure at least 0.5% gutter fall
- Crossfalls at intersections should be maintained on the priority road and adjusted on the minor road
- Crossfalls may be varied in the turning area of Access Place/Ways to allow for gutter outfall.
- Inverted crowns are prohibited in all roads except laneways.

3.7 Intersections

- Intersecting roads should be at right angles but not less than 70 degrees unless a roundabout treatment is applied.
- Opposing staggered intersections on a priority road should facilitate a left turn/right turn movement. Right turn/left turn movements are to be avoided.
- The minimum vehicle-turning path should be for a “design single unit truck”. (Min. 12m R)
- Kerbing shall be semi-mountable.
- Minimum kerb radii should be:

Access Place/Way	12m
Local Distributor	12m
District Distributor and Industrial	15m
- Sight distances are to comply with the “Austroads Design Guidelines”

3.8 Access Place/Way

- Turning circles should be 9m radius to the edge of the seal or be so configured to enable a “design single unit truck” to make a three point turn.
- Tapers at the turning circle should be 15m radius.
- Except at intersections kerbing shall be mountable.

3.9 Roundabouts

- Design approach speed 60kph
- Ensure adequate deflection to maintain low traffic speeds on through movements
- Central island to be minimum of 5m radius
- Kerbing around the central island is to be mountable
- Annulus to be minimum 2.5m wide
- Provide for adequate night time visibility
- Ensure visibility over central island (low plantings etc for long-term visibility)
- Provide safe facilities for cyclists and pedestrians
- Hard and soft treatments to the central island are to be frangible.
- Irrigation conduits shall be placed prior to the final seal and shall be 100mm dia. Class A PVC with 600mm cover.

3.10 Laneways

- Cross section is to be designed such that the carriageway is hard against one boundary (opposite side to street light poles) and, opposite, the gap between the flush kerb and the other boundary is to be infilled with concrete to serve as a pedestrian refuge and protection for street lighting poles. (No bollard lights to be installed).
- The kerbing of the Access Place/Way is to be continued across the intersecting pavement of the Laneway

3.11 Battle-axe Block/Common Property Access Legs

- The standard of construction is to be the same, in all respects, to that required in the Council's specification for Vehicle Crossover Specification and Form.

3.12 Footpaths

- Footpaths and Dual-use paths are to be provided as required under the "Liveable Neighbourhoods" guidelines.
- Footpaths and Dual-use paths may be built as part of the subdivision works or an agreed amount may be paid to Council who will then undertake the works when most of the housing is completed (with preference being all paths to be bonded with the City for construction at a later date).
- Pram ramps are to be constructed as part of the kerbing works.
- Min width for all paths is 1.5m, and DUP's 2.1m
- To minimise maintenance costs footpaths in road reserves will be of plain concrete with a broomed finish or coloured broomed finish plain concrete with easily obtainable colouring or a combination of either of the previous with a brick header course edging and a brick cross band every second expansion joint. Where coloured paving is required for consistency, colours to be similar and consistent with the adjoining development and approved separately by the City. Red asphalt shall be 40mm thick dense graded.

3.13 Street Name Plates

- Street name plates be constructed using 200mm blades with 100mm or 150mm letters, coloured with blue letters on a reflective white background and,

where practical, incorporating 50mm blue house numbers and Council's Corporate Logo (as per City of Cockburn Specification Policy).

3.14 Street Lighting

- Street lighting including suitable illumination of traffic management treatments, to the newly created subdivision is to be provided in accordance with Western Power Corporation specification for illumination levels, materials and installation. Lighting design shall be in accordance with the latest edition of Australian Standards AS 1158-2005 and light pole types, colours and light fixtures to be similar and consistent with the adjoining development and approved separately by the City.
- Council is moving towards sustainable street lighting, the developer will therefore be encouraged to use LED luminaries wherever possible, currently powder-coated standard light poles in WP decorative range colours are available with LED luminaires.
- Illumination is not to spill beyond the front building line of the adjacent properties unless required for security purposes.

3.15 "As Constructed" Information

The following "As Constructed" information, nominating the coordinate system used, is to be provided:

- A road and stormwater drainage layout plan, including footpaths, (if constructed) median islands etc., showing actual "as constructed" locations and levels on double matt polyester film marked and signed as such.
- A digital "As Constructed" copy on Australian MG94 Grid of the lot boundaries, road and stormwater drainage drawings in D-Spec and RSpec format is to be supplied on disc or by e-mail.
- A copy of all compaction tests results, including the asphalt and compliance certificates for the earthworks and road pavements are to be submitted.
- A Certificate of Compliance that the road and stormwater drainage infrastructure has been completed in accordance with the approved design drawings and specification is to be signed off by the developer's project superintendent.

3.16 Standard Detail Design Drawings and Conditions

- The standard detail design drawings provided for download on the City of Cockburn's website (click on Council Services, Engineering Services, then Engineering Guidelines) are to be used on all subdivisions design and constructed within the City of Cockburn
- Engineering conditions and accountabilities imposed on subdivision developments will be based on the template SUBDIVISION CONDITIONS TEMPLATE.

4.0 Public Open Space

4.1 Public Open Space Development Guidelines.

The City of Cockburn has introduced a separate set of guidelines for development of POS as follows;

- POS Development Guide,
- a three volume generic Irrigation Design Specification, and
- a sports pitch design specification document,

These are to be read in conjunction with this subdivision design guide.

These documents are available on the City's website at the following address;

[https://www.cockburn.wa.gov.au/getattachment/d1b66ef3-8232-4c9d-897c-f66a08982261/ecm_6946000_v1_public-open-space-\(pos\)-development-guidelines-october-2013-rev-i-pdf.aspx](https://www.cockburn.wa.gov.au/getattachment/d1b66ef3-8232-4c9d-897c-f66a08982261/ecm_6946000_v1_public-open-space-(pos)-development-guidelines-october-2013-rev-i-pdf.aspx)