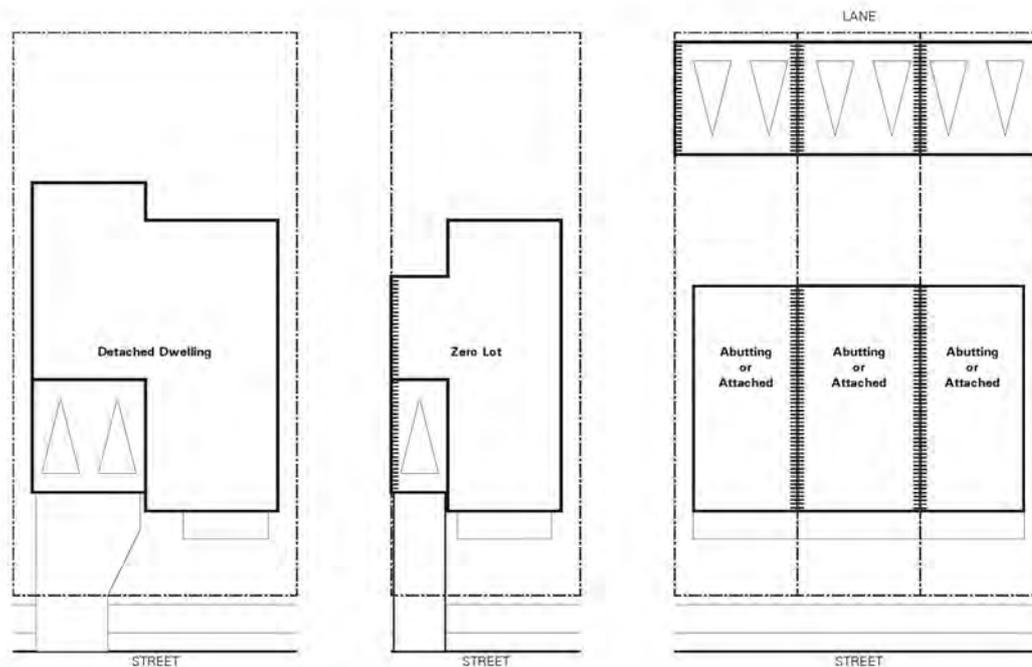


# Appendix A

## Glossary

**Note:** definitions for terms are also included in the Dictionary contained within the Growth Centres SEPP, and in the event of any inconsistency, the definition in the Growth Centres SEPP takes precedence over the definitions in this DCP.

**“Abutting Dwelling”** is a building containing one dwelling, on a single block of land, that is designed and constructed on a zero lot line immediately adjacent to another dwelling on a different lot that is also built to the zero lot line and is structurally independent of any other dwelling. See **Figure 1**.



**Figure 1:** Detached, Zero Lot Line, Abutting and Attached Dwellings

**“Access Streets and Laneways”** provide local residential access to a small number of dwellings and serve a shared vehicular-pedestrian-cyclist use. They are intended to encourage a safe, low vehicle speed environment in which the residential function is dominant. Access streets function at the lowest level of the road hierarchy. They generally have development on one side and are located along drainage or open space reserves or along access-denied roads. The construction and dedication of access streets is the responsibility of the developer.

**“Articulation zone”** includes verandahs, porches, awnings, shading devices, bay windows, pergolas and the like. A carport is not considered part of the activation zone.

**“Active Frontages”** are defined as one or a combination of the following:

- entrance to retail;
- shop front;
- glazed entries to commercial and residential lobbies;

- café or restaurant if accompanied by an entry from the street;
- active office uses, such as reception, if visible from the street; and
- public building if accompanied by an entry.

“**Alex Avenue Precinct Plan**” means Appendix 3 to *State Environmental Planning Policy (Sydney Region Growth Centres) 2006*.

“**Attic**” means a room within the main roof space of a building that has a 1.5m minimum wall height at edge of the room, a minimum 30 degree ceiling slope and does not incorporate or access a balcony.

“**Attached dwellings**” are 3 or more dwellings or separate allotments that are joined by at least one party wall. See **Figure 1**.

“**Arterial roads**” are roads marked as such on the **Precinct Road Hierarchy** figure in the relevant Precinct Schedule. They are major roads that carry the majority of inter-regional traffic. Vehicular access from adjacent land is denied to ensure both the efficiency of the road and the safety of road users.

“**Building footprint**” means the area of land measured at finished ground level that is enclosed by the external walls of a building.

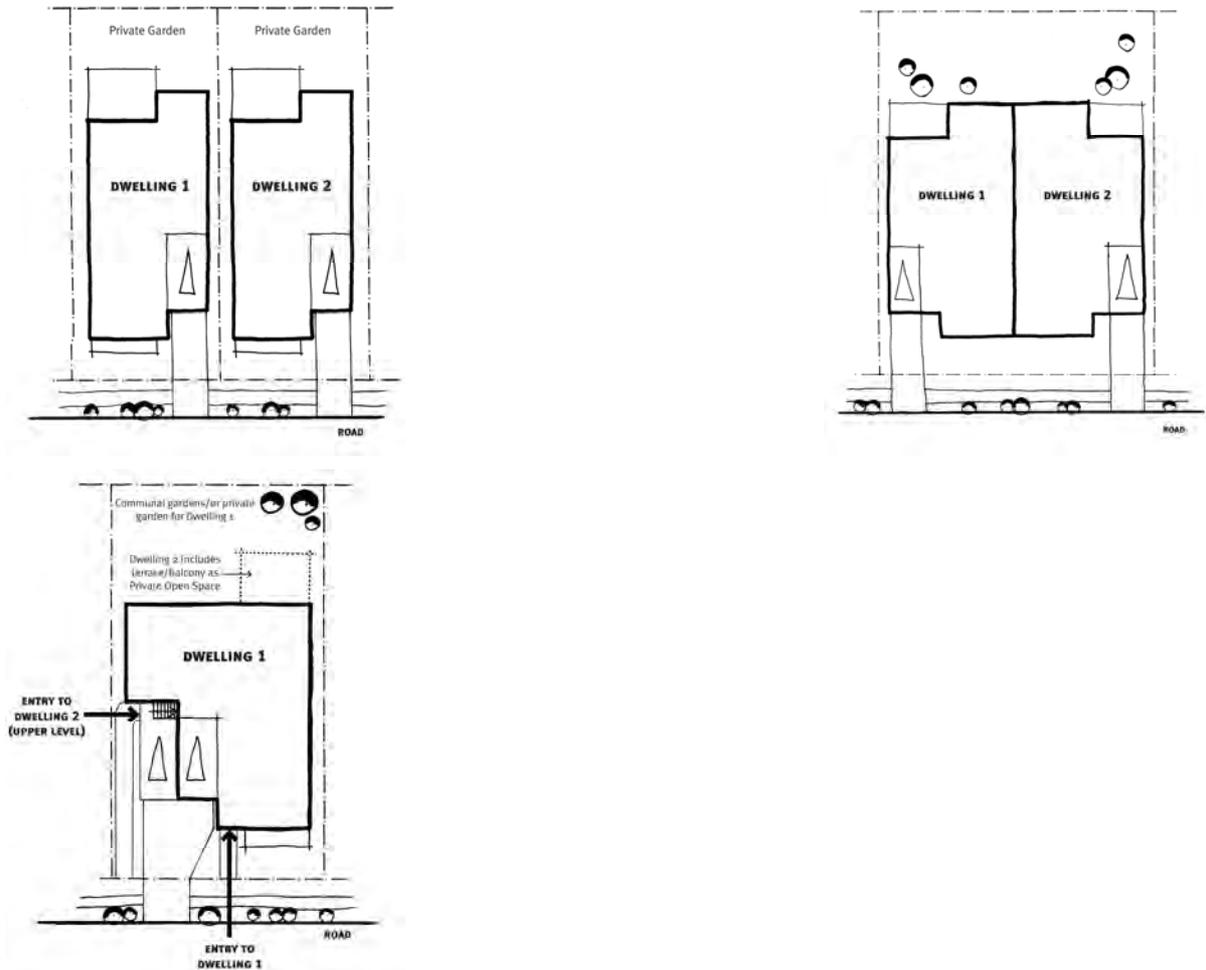
“**Collector roads**” are roads marked as such on **Figure 3-11** of this DCP. They are the main internal roads that carry local traffic through the residential neighbourhoods to the sub-arterial and arterial roads, and provide access to major attractors within the precinct such as retail, commercial and educational facilities.

“**Detached Dwelling**” is a building containing one dwelling, on a single block of land, that is not attached to any other dwelling. See **Figure 1**.

**Dual Occupancy** means two dwellings on a single allotment of land. The dwellings may be attached to each other or separate and detached.

Dual occupancy housing includes:

- the alteration or addition to an existing dwelling-house erected on an allotment so as to create two dwellings;
- the erection of another detached dwelling-house in addition to one already erected on an allotment, but only if not more than two dwellings will be created as a result of the development being carried out;
- the erection of a single building containing two dwellings on one allotment.
- the erection of two detached dwellings on one allotment. The dwelling may or may not be strata subdivided. See **Figure 2**.

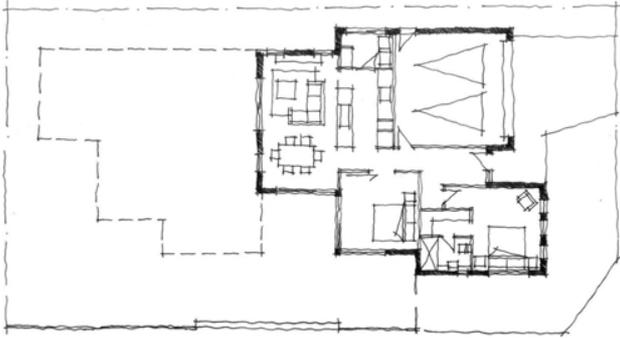


**Figure 2:** Dual Occupancy Dwellings - detached; attached; two storey

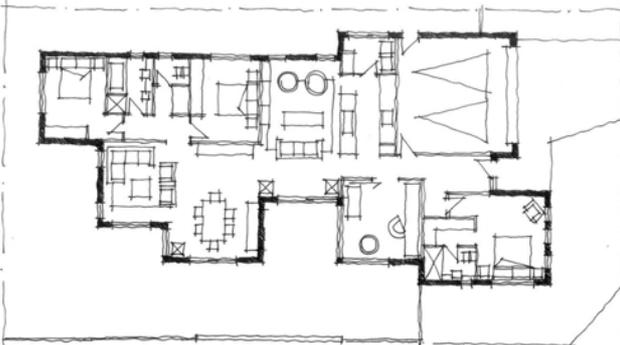
**“Dual Occupancy – Lifehouse Dwellings”** - The life house is a housing initiative that is designed to facilitate the changing lifestyle needs of the home buyer. When built, the Lifehouse can respond to the current need of the resident. In time, as the residents’ needs change, the dwelling can grow/downsize according to their needs, without them having to go through the expense of relocating. See **Figure 3**.

Lifehouse dwellings:

- can only occur on corner lots where eventual dual access will be possible to both dwellings;
- can be built on a single level, on split level or on as two storey dwellings. The development of Stage 2 must comply with separation controls nominated in Australian Standards and the Building Code of Australia (BCA), enabling the final dual occupancy division of Stage 3 to progress without major works.
- must have all stages of the development designed and approved as part of the initial DA regardless of the proposed staging of construction and subdivision.



**Phase 1: establish the home**



**Phase 2: grow to suit occupant**



**Phase 3: downsize and strata subdivide to suit occupant (Optional)**

**Figure 3:** Lifehouse Dwelling (single level)

“**Flood Planning Levels (FPLs)**” are the combinations of flood levels (derived from significant historical flood events or floods of specific AEPs) and freeboards selected for floodplain risk management purposes, as determined in management studies and incorporated in management plans. Flood planning area is the area of land below the FPL and thus subject to flood related development controls. The concept of flood planning area generally supersedes the “flood liable land” concept in the 1986 Manual. Flood Prone Land is land susceptible to flooding by the PMF event. Flood Prone Land is synonymous with flood liable land.

“**Habitable room**” means any room or area used for normal domestic activities, including living, dining, family, lounge, bedrooms, study, kitchen, sun room, home entertainment room, alfresco room and play room.

“**Non-habitable**” room spaces of a specialised nature not occupied frequently or for extended periods, including bathrooms, toilets, pantries, walk-in wardrobes, corridors, lobbies, photographic darkrooms and clothes drying rooms.

**“Landscaped area”** means any part of a site, at ground level, that is permeable and consists of soft landscaping, turf or planted areas and the like. It does not include driveways, parking areas, hard paved drying yards or other service areas, swimming pools, tennis courts, undercroft areas, roofed areas (excluding eaves <450mm to fascia board), outdoor rooms, balconies, rooftop gardens, terraces, decks, verandahs and the like.

**“Local roads”** are roads marked as such on **Figure 3-12** of this DCP. The function of the subdivisional roads, which may include minor loop roads and culs-de-dac, is to provide access to residential properties.

**“Manor Home”** means a means a 2-storey building containing 4 dwellings, where:

- (a) each storey contains 2 dwellings, and
  - (b) each dwelling is on its own lot (being a lot within a lot within a strata scheme or community title scheme), and
  - (c) access to each dwelling is provided through a common or individual entry at ground level,
- but does not include a residential flat building or multi-dwelling housing.

**“Outdoor room”**, also known as an ‘alfresco room’ is a semi enclosed space (at least 1 side open) located adjacent a living / dining / kitchen area of a dwelling that sits within the main roof line of a dwelling.

**“Principal dwelling”** means the largest dwelling house on a lot, measured by gross floor area.

**“Principal private open space”** means the portion of private open space which is conveniently accessible from a living zone of the dwelling, and which receives the required amount of solar access.

**“Private open space”** means the portion of private land which serves as an extension of the dwelling to provide space for relaxation, dining, entertainment and recreation. It includes an outdoor room.

**“Riparian Corridor”** means the core riparian zone and vegetated buffer as shown in the ILP.

**“Secondary Dwellings”** - Secondary dwellings are dwellings that are separate to the principle dwelling, have a separate access and have a maximum internal floor area of 110m<sup>2</sup>.

Secondary dwellings must form a part of the DA submission for the main dwelling. A secondary dwelling that has its own separate access and parking can be strata subdivided at the time of DA approval or after the dwelling has been established.

Types of secondary dwelling:

- On grade studio unit (at ground level – See **Figure 4** and **5**) within the principle dwelling lot. This is only permitted within detached dwelling lots;
- Above garage (See **Figures 6** and **7**). This is only permitted on dwelling lots that have garages with rear access.

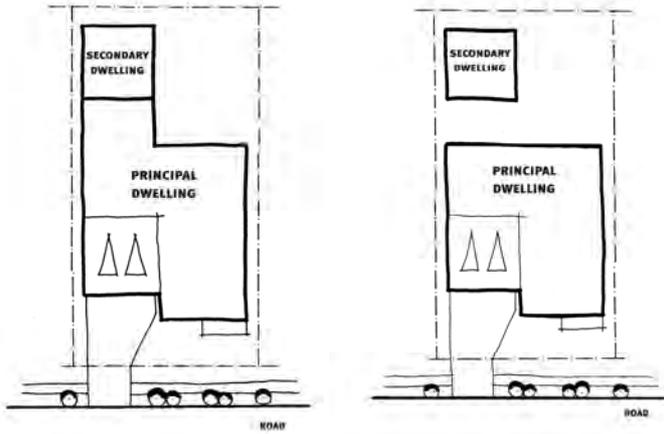


Figure 4: Secondary Dwelling (at ground level)



Figure 5: Indicative example of a secondary dwelling - on ground level

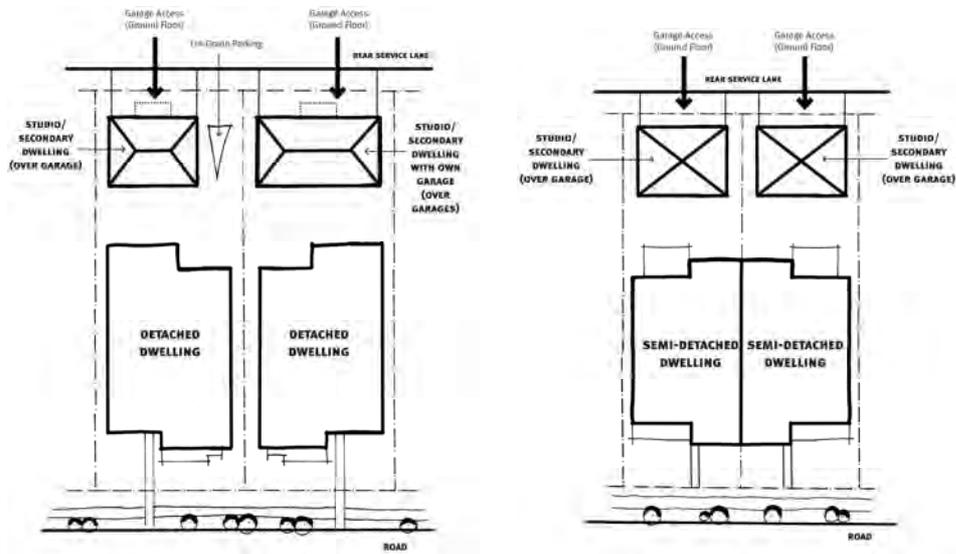
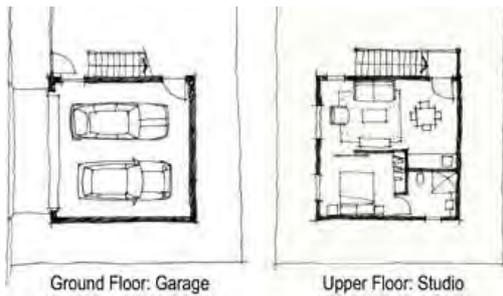
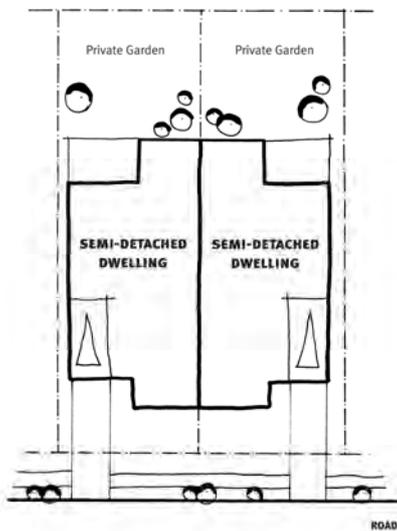


Figure 6: Secondary or Studio Dwellings (above garages)



**Figure 5:** Indicative example of a secondary dwelling above a garage

“**Semi-detached dwellings**” is defined in the Dictionary to the Growth Centres SEPP. They comprise two dwellings that share one common wall. The external appearance should have continuance of material and style so the two dwellings combine to appear as one large house.



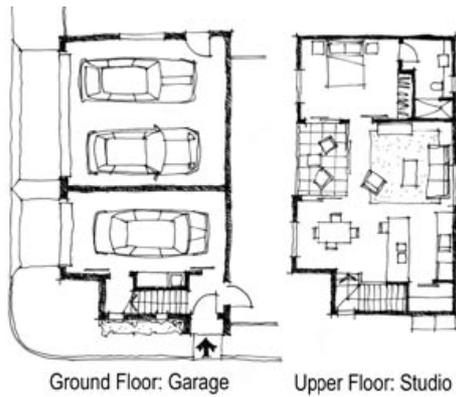
**Figure 8:** Semi-Detached Dwelling

“**Site cover**” refers to the percentage of the site area that is occupied by the building footprint, including any outdoor room and garages.

“**Studio Dwelling**” means a dwelling that:

- (a) Is established in conjunction with another dwelling (the *principal dwelling*), and
- (b) Is on its own lot of land, and
- (c) Is erected above a garage that is on the same lot of land as the principal dwelling, whether the garage is attached to, or separate from, the principle dwelling (refer to **Figures 6 and 9**).

but does not include a demi-detached dwelling.



**Figure 9:** Indicative example of a studio dwelling above a garage

“**Sub-arterial roads**” are roads marked as such on the **Precinct Road Hierarchy** figure in the relevant Precinct Schedule and as shown on **Figure 3-10** of this DCP. Sub-arterial roads link regional and local traffic routes. Access from private properties is generally denied to these roads (except in special circumstances) for reasons of traffic safety and to maintain the capacity and efficiency of the road system. Council is normally responsible for the acquisition and construction of sub-arterial roads.

“**Town Centre Streets**” are roads marked as such on the **Precinct Road Hierarchy** figure in the relevant Precinct Schedule. They are specially designed to create a pleasant and comfortable pedestrian environment. Amenity and safety is to be maintained through wide shaded footpaths, traffic calming measures and pedestrian crossings.

“**Walking Distance**” is typically 400m or a 5 minute walk.

“**Zero Lot Line Dwelling**” is a building containing one dwelling, on a single block of land, that is constructed with an exterior wall on one of its side boundaries but is not attached or abutting to any other dwelling. See **Figure 1**.

# Appendix B

## Riparian Protection Area Controls



## **1.0 Introduction**

### **1.1 Land to which these Controls Apply**

This Appendix applies the land that contains, or is adjacent to, a riparian protection area, as defined in this DCP.

### **1.2 Purpose of this Appendix**

The purpose of this Appendix is to set the outcomes and requirements for permissible development on land containing a riparian protection area in the North West Growth Centre Precincts to which the Blacktown Growth Centre Precincts DCP applies.

### **1.3 Structure of this Appendix**

This Appendix is structured as follows:

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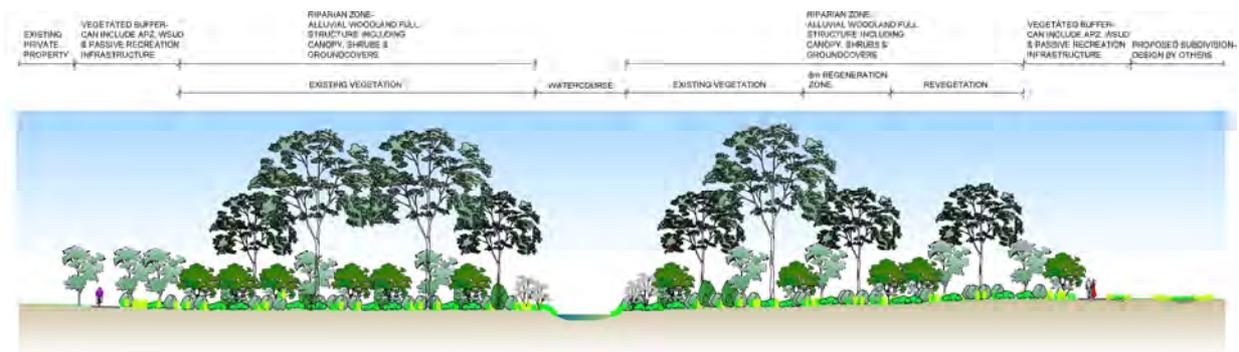
<b>Section 1:</b>	provides an introduction to the Appendix.
<b>Section 2:</b>	outlines the controls for preferred development
<b>Section 3:</b>	outlines the controls for alternative development.
<b>Section 4:</b>	establishes the desired outcomes for riparian protection areas.
<b>Section 5:</b>	outlines the controls for the riparian protection area.
<b>Section 6:</b>	provides maintenance, monitoring and completion procedures.

## 2.0 OUTCOMES

### 2.1 Outcomes for Category 1 Watercourses

The following outcomes must be achieved for all waterfront land relating to Category 1 watercourses as identified in the Blacktown Growth Centre Precincts DCP, as demonstrated in **Figure 1** below:

- Outcome 1:** To maintain and improve the natural functions of the watercourse and its aquatic and terrestrial qualities and provide a continuous, vegetated riparian corridor for the movement of flora and fauna species.
- Outcome 2:** To maintain and improve the viability of native riparian vegetation.
- Outcome 3:** To provide a continuous, viable Core Riparian Zone (CRZ) which emulates the native vegetation communities in the area to facilitate a stable watercourse, while allowing limited opportunities for vegetated dry basins in a manner that does not reduce the function of the CRZ.
- Outcome 4:** To provide a protecting Vegetated Buffer (VB) either side of the CRZ, to protect the environmental integrity of the CRZ from weed invasion, micro-climate changes, litter, trampling and pollution by emulating the native vegetation communities in the area, while allowing limited passive recreation, open space and water quality treatment that does not reduce the function of the CRZ.
- Outcome 5:** To recognise that the riparian protection areas are located within urban contexts and provide, in addition to their environmental benefits, valuable amenity, character, landscape and open space benefits to the people who live, work and play in the local area.
- Outcome 6:** Any realigned watercourse must meet all of the above outcomes.



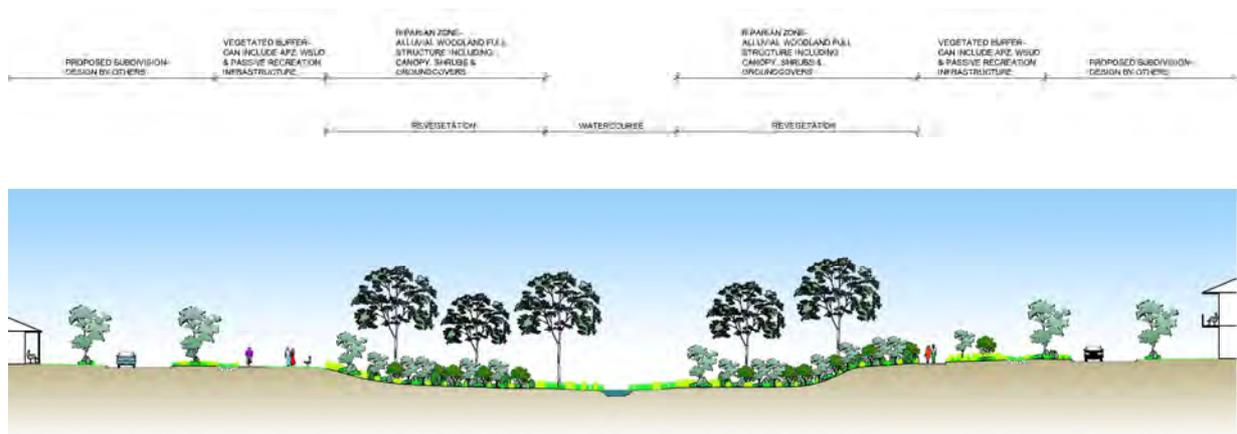
**Figure 1:** Illustration of a Category 1 watercourse that achieves the outcomes of these controls

**Source:** GHD

## 2.2 Outcomes for Category 2 Watercourses

The following outcomes must be achieved for all waterfront land relating to Category 2 watercourses as identified in the Blacktown Growth Centre Precincts DCP, as demonstrated in **Figure 2** below:

- Outcome 1:** To maintain and improve the natural functions of the watercourse and its aquatic and terrestrial qualities and provide a continuous, vegetated riparian corridor for the movement of flora and fauna species.
- Outcome 2:** To maintain and improve the viability of native riparian vegetation.
- Outcome 3:** To provide a continuous, viable CRZ which emulates the native vegetation communities in the area to facilitate a stable watercourse, while allowing limited opportunities for vegetated dry basins in a manner that does not reduce the function of the CRZ.
- Outcome 4:** To provide a protecting VB either side of the CRZ, to protect the environmental integrity of the CRZ from weed invasion, micro-climate changes, litter, trampling and pollution by emulating the native vegetation communities in the area, while allowing limited passive recreation, open space and water quality treatment in a manner that does not reduce the function of the CRZ.
- Outcome 5:** To recognise that the riparian protection areas are located within urban contexts and provide, in addition to their environmental benefits, valuable amenity, character, landscape and open space benefits to the people who live, work and play in the local area.
- Outcome 6:** Any realigned watercourse must meet all of the above outcomes.



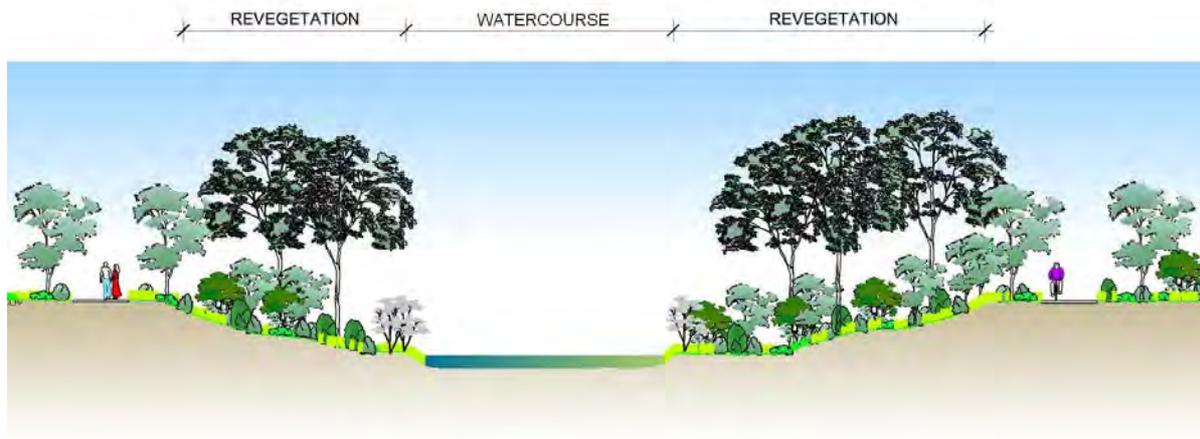
**Figure 2:** Illustration of a Category 2 watercourse that achieves the outcomes of these controls

Source: GHD

## 2.3 Outcomes for Category 3 Watercourses

The following outcomes must be achieved for all waterfront land relating to Category 3 watercourses as identified in the Blacktown Growth Centre Precincts DCP, as demonstrated in **Figure 3** below:

- Outcome 1:** To retain, maintain and restore where possible the natural functions of the watercourse including bed and bank stability to protect local water quality.
- Outcome 2:** Where the natural functions of a stream are proposed to be retained and restored, a continuous, viable CRZ which emulates the native vegetation communities in the area is to be provided to facilitate a stable watercourse.
- Outcome 3:** Where it is not possible to retain the natural functions of a stream, an engineered solution to the watercourse will be considered subject to the proposed development satisfactorily demonstrating minimal impacts on downstream riparian protection areas.



**Figure 3:** Illustration of a Category 3 watercourse that achieves the outcomes of this Strategy

Source: GHD

### 3.0 Controls for Preferred Development

- (1) This section applies to development on land containing a riparian protection area that is generally consistent with the Indicative Layout Plan in the relevant Precinct Schedule in this DCP. This section applies to the land adjacent to the riparian protection area only. Section 5.0 contains controls for development within the riparian protection area.
- (2) Development to which this section applies will, in most circumstances, consist of roads, drainage or open space.
- (3) For those areas where residential, commercial or industrial land immediately abuts a riparian protection area (as shown on the Indicative Layout Plan), development shall be located and designed to achieve a satisfactory interface with the riparian protection area. Consideration must be given to issues such as surveillance of the riparian protection area, built form and design, landscaping, activation of interfaces, where appropriate, and protection from bushfire threat.
- (4) Council may consider additional areas of residential, commercial or industrial land immediately abutting a riparian protection area as being generally consistent with the Indicative Layout Plan (and therefore being preferred development) where the development is designed to achieve a satisfactory interface with the riparian protection area. The considerations in sub-clause (3) above will apply.
- (5) Where a proposed development is not generally consistent with the Indicative Layout Plan, Section 4.0 shall apply. Minor variations from the Indicative Layout Plan may be considered to be generally consistent with the Indicative Layout Plan (refer to sections 1.4 and 2.1 of Part A of this DCP).

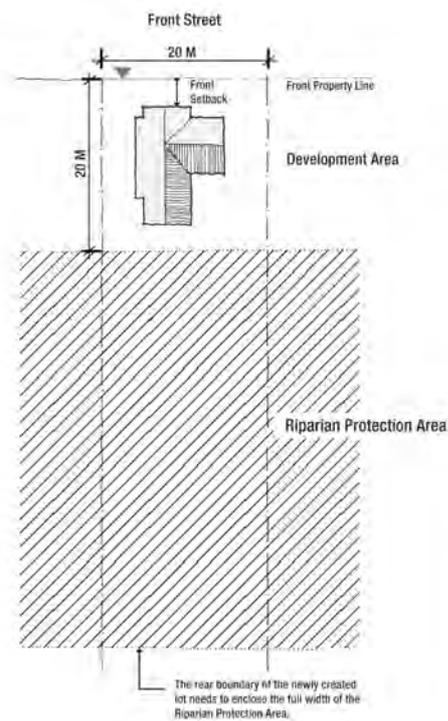
*Note: The relevant Precinct Plans may include provisions enabling development that is permitted to be carried out in an adjoining zone to be carried out in land that is identified as a riparian zone (refer to clause 5.3 Development near zone boundaries in the relevant Precinct amendment to SEPP (Sydney Region Growth Centres) 2006. This provision exists to enable minor zone boundary anomalies to be corrected when subdivision and/or development occurs. In the case of development that would encroach into a riparian protection area, such development would only be acceptable where the outcomes for the relevant riparian zone in Section 2 above are still achieved.*

*Note: Where a Plan of Management (pursuant to Division 2 of Part 2 of Chapter 6 of the Local Government Act) is prepared for open space adjacent to a riparian protection area, the Council shall ensure that the Plan of Management has regard to and complements the riparian objectives of the adjoining land. For all other land adjoining riparian protection areas (including road verges), consideration should be given to a landscape strategy that will not detrimentally affect the riparian protection area.*

### 4.0 Controls for Alternative Development

- (1) This section applies to development on land containing a riparian protection area that is not consistent with the Indicative Layout Plan in the relevant Precinct Schedule to this DCP. This section applies to the land adjacent to the riparian protection area only. Section 5.0 contains controls for development within the riparian protection area.
- (2) Development to which this section applies must be designed in a manner that ensures the orderly and coordinated development of the land and to achieve a sustainable outcome for the riparian protection area.
- (3) To reduce fragmentation, new lots in the Riparian Protection Area must include the full width of the riparian protection area within the Precinct. Where the full width of the riparian protection area extends outside of the precinct, the centerline of the watercourse shall form the boundary of the new lots. Fencing will not be permitted on this boundary. See clause (13) in Section 5.0 for more controls relating to fencing in riparian protection areas.
- (4) Residential development is restricted to single detached dwellings on lots with a minimum area of 1000 m<sup>2</sup> and minimum frontage (width) of 20 metres.
- (5) Dwellings are to be located wholly outside the riparian protection area as shown in **Figure 4** below.
- (6) Non-residential development, including all structures and open space areas proposed on land zoned RE2 are to be principally located outside of the riparian protection area. See clause (3) in Section 5.0 for more controls relating to land uses within the vegetated buffer of the riparian protection area.

- (7) Where the full width of the riparian corridor is contained within the precinct, a perimeter road including pedestrian and cycle paths shall be provided on the opposite side of the riparian protection area to the developable area of the lot. Where the full width of the riparian protection area extends outside of the precinct, local open space shall be located at intervals of no less than 600m along the riparian corridor to provide opportunities for public access to land adjacent to the riparian protection area. Pedestrian and cycle paths shall be located within these local open space areas and shall connect the local open spaces to each other.
- (8) Buildings in the developable area of the land containing a riparian protection area must either be set back the required distance from the riparian protection area or be designed and constructed in accordance with the Planning for Bushfire Protection guidelines. See clause (4) in Section 5.0 for more controls relating to asset protection zones within the vegetated buffer of the riparian protection area.
- (9) Fencing between developable area and riparian protection area is permitted, subject to the fencing being designed to prevent pet or weed invasion into the riparian protection area. Signage shall be placed on the fencing to discourage access into the riparian protection area by people for recreational purposes or other purposes not associated with the maintenance of the riparian protection area.



**Figure 4:** Location of Dwellings Adjacent to Riparian Protection Areas

## 5.0 Controls for the Riparian Protection Area

- (1) Development on land to which this section applies must achieve the outcomes identified in Section 2.0 and comply with the requirements of this Section.
- (2) The CRZ and the VB are to remain, or become vegetated, with local native vegetation (trees, shrubs and groundcover species). Non-local native vegetation may be considered by Council if it is demonstrated that the proposed planting scheme will not compromise the achievement of the outcomes identified in Section 4.0.
- (3) Passive recreation use, or open space uses (eg walking and cycle paths, seating, interpretive signage) cannot exceed 40% of the area of the VB and must be designed to ensure no reduction in the function of the CRZ.

The maximum 40% area should generally be located along the outer edge of the VB, however where landform or design dictates, the 40% area may meander through the VB. Where the 40% area meanders towards the CRZ it should generally come no closer than 4m to the outer edge of the CRZ, unless the applicant can demonstrate that the outcomes for the riparian protection area will be achieved. Consideration should be given to the location of the watercourse within the CRZ when determining the proximity of the 40% area to the CRZ. The 40% area shall be applied on an individual DA basis and shall not be accumulated across DAs. Consideration should be given to aligning the location of the 40% area with the design of the VB on adjoining land where already developed or where there are approved plans.
- (4) An Asset Protection Zone (APZ), or any part of an APZ, must not be located within the CRZ. An APZ will only be permitted within the VB where it can be demonstrated that it achieves the functions of the VB, does not result in an increased maintenance burden and where the planting scheme is compatible for both riparian functions and minimising bushfire risk. Consideration may be given to a planting scheme in a VB that has a reduced fire load in certain locations where sensitive land uses, such as schools, retirement villages, etc, are adjacent to the riparian protection area, subject to the planting scheme and ongoing vegetation management measures continuing to achieve the functions of the VB and maintaining a reduced fuel load.
- (5) Constructed wetlands are not permitted within the CRZ. Constructed detention basins will only be permitted within the CRZ where it can be demonstrated that it achieves the functions of the CRZ, are vegetated dry basins only and designed in compliance with the relevant guidelines.
- (6) Where works or development are proposed within a riparian protection area, a Vegetation Management Plan (VMP) that outlines the criteria for the establishment and management of a riparian protection area and will be required to be prepared and submitted to the Council for assessment and approval prior to the issuing of a construction certificate. The VMP shall be undertaken in accordance with the relevant guidelines.
- (7) A Works Plan (WP) is to be approved for any development that requires works in a riparian protection area prior to the commencement of works. The WP shall be undertaken in accordance with the relevant guidelines.
- (8) The design and construction of watercourse crossings and ancillary works, such as roads, should consider the potential impacts of the crossing structure on the riparian protection area. In order to minimise the effects of structures on the hydrologic, hydraulic and geomorphic functions of a watercourse, crossings should be designed and constructed in order to maintain the integrity of the existing channel as well as being sympathetic with the ecological values of the watercourse and its riparian protection area. Bed level crossings or bridges which fully span the watercourse channel provide the best opportunities for maintaining natural channel functions. However, alternative structures such as box culverts which can achieve the riparian functions will also be considered.
- (9) The design and construction of stormwater outlets should aim to be 'natural', yet provide a stable transition from a constructed drainage system to a natural flow regime. The design and construction footprint and extent of disturbances within the riparian protection area should be minimised while still achieving the intended discharge function.
- (10) The design and construction of works and activities within a watercourse should aim to be as 'natural' as possible. A watercourse 'rehabilitation' design philosophy rather than a 'construction' philosophy should be applied. The design and construction footprint, and the extent of disturbances within the riparian protection area should be minimised while achieving the desired function and outcome. In order to minimise the impacts of in-stream works on the hydrologic, hydraulic and geomorphic functions on a watercourse, all works and activities should be designed and constructed to maintain the integrity of the existing channel, as well as being sympathetic with the ecological values of the watercourse and its riparian protection area.
- (11) When considering the placement of utilities in or across watercourses the design and construction footprint and the extent of disturbances proposed in the watercourse and riparian protection area should be minimised.

- (12) Any path (including cycleways and accessways) design and construction must be in accordance with the relevant guidelines. In particular:
- Paths should be located beyond the CRZ (except for direct crossings).
  - Paths should be located so as to avoid, or minimise, disturbance of any *Endangered Ecological Community* or any threatened species.
  - Paths that intrude into an existing vegetated area of a CRZ for a crossing should, where possible, be elevated with a minimum underside clearance of 300mm and with a natural ground surface beneath, and designed to pass light and moisture sufficiently to allow the growth of groundcover vegetation beneath the structure. In areas affected by flooding up to the 1 in 100 year flood extent the elevation needs to also meet any flooding requirements.
  - Paths and related structures, that traverse watercourses or riparian protection areas should not adversely affect watercourse and floodplain flows, exacerbate flooding or prevent adequate rainfall and daylight reaching the watercourse and riparian vegetation (e.g. bridges or view platforms that result in extensive periods of shadow).
  - Access to watercourse/foreshore edges may be provided occasionally by branch paths. Access and viewing points must be designed so they do not adversely affect any of the bio-physical functions of the CRZ.
- (13) Fencing within the riparian protection area is to be minimised. Where fencing is required it is to be designed to allow terrestrial and aquatic fauna to pass. Open post and rail style fencing is preferred.

*Note: A Controlled Activity Approval is required for all works within the riparian protection area, unless a precinct-wide exemption is granted through the approval of a Waterfront Land Strategy for the precinct.*

*Note: Where a Plan of Management (pursuant to Division 2 of Part 2 of Chapter 6 of the Local Government Act) is prepared for open space within a riparian protection area, the Council shall ensure that the Plan of Management has regard to and complements the riparian objectives of the adjoining land.*

## **6.0 Maintenance, Monitoring and Completion**

- (1) A maintenance period will commence from the date of practical completion of the works.
- (2) Applicants must undertake a program of monitoring and reporting during the maintenance period that demonstrates how the development on land to which this strategy applies is achieving the requirements of any development consent and the outcomes and requirements of this strategy. Copies of monitoring reports shall be provided to the Principal Certifying Authority (PCA) at least once a year. If the PCA is not the Council, the PCA will make available any such reports to Council and DWE.
- (3) The PCA will undertake inspections of the waterfront land under maintenance at least once a year and will advise the applicant in writing within 28 days of the date of the inspection whether the outcomes and requirements are or are not being achieved.
- (4) The maintenance period will end on the date at which the PCA is satisfied that the outcomes stated in Part 4 of this strategy have been achieved, or 5 years from the commencement of the maintenance period, whichever comes first. The maintenance period may extend beyond the 5 year period only where the PCA has informed the applicant that the outcomes and requirements are not being achieved in accordance with (3) above.
- (5) For the purposes of this section, the PCA will be satisfied that the environmental outcomes have been met where the works have been undertaken and maintained in accordance with the Vegetation Management Plan.
- (6) At the end of the maintenance period the applicant must provide a final written report to the PCA which demonstrates completion of the development and maintenance period in accordance with the requirements of their development consent and this strategy.
- (7) Applicants must provide the PCA with a Certification of Maintenance Practical Completion to current recommended practices and consistent with this strategy. The certificate must be prepared by persons suitably experienced and qualified in such certification for all stages.

# Appendix C

## **Salinity Management Guidelines**



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*The Department would like to acknowledge Douglas Partners Pty Ltd and Sydney Environmental and Soil Laboratory, Blacktown City Council and Landcom for sections of this document taken from the Salinity Management Report for Second Ponds Creek (1998).*

# 1 Introduction

This Salinity Management Plan contains background information, salinity risk mapping and management recommendations to control the effects of urban dryland salinity for proposed residential development within the Blacktown Growth Centre Precincts in the North West Growth Centre.

This Management Plan is based on findings of a SMEC study for the Alex Avenue Precinct and the approach taken in the Salinity Management Plan prepared for the adjacent Second Ponds Creek release area. This plan includes:

- general information on the causes and effects of urban salinity;
- findings and conclusions from SMEC's Land Capability and Contamination Study for Alex Avenue (2007).
- Recommendations, measures and general guidelines for site development and construction, covering water management, site development and buildings.

The aim of this Plan is to present practical recommendations about how to manage and, where possible, mitigate the existing saline conditions on site, so as to:

- limit any impact of salinity on roads, buildings, vegetation, underground services, water courses and storages; And
- limit the impacts of development in the precinct on the processes of salinity and the impacts of salinity on the environment.

## 1.1 Background

### 1.1.1 Proposed Development

Planning for North West Growth Centre is expected to provide for up to 71,000 new homes, developing progressively over the next 25 to 30 years, together with essential facilities and open space. The Precincts will be supported by Town Centres and smaller neighbourhood centres will provide local retail and community services. Several infrastructure upgrades are planned including new road crossings and the Richmond rail line upgrade which will improve regional links to surrounding areas.

### 1.1.2 Salinity Risk Maps

A review of the Department of Natural Resources Map of Salinity Potential in Western Sydney (2002) indicated that the site is located in an area of Moderate Salinity potential. The majority of the area was given a Moderate Salinity Classification. Creek lines were classified as having High Salinity Potential.

This is taken into account in the Salinity Hazard Assessment for individual Precincts and discussed in **Section 2** of this Management Plan.

### 1.1.3 Geology

The subsurface conditions encountered in the boreholes comprise topsoil, fill, silty clays and weathered shale. Details are as follows:

**FILL/TOPSOIL:** Present in all boreholes to depths of 0.2 to 3.0 metres.

**SILTY CLAYS:** Present in all boreholes to depths of 1.0 and 6.5 metres. The strengths vary between firm to stiff and very stiff.

**WEATHERED SHALE:** Present in all boreholes to the depth of auger refusal of between 1.4 to 8.6 metres.

## 1.2 The Causes of Urban Salinity

Soils containing salts occur naturally in western Sydney due to underlying geological formations. In undisturbed areas the salts are generally stored below the plant root zone where they have minimal impact. The development of Western Sydney has disturbed the soil profile, altered hydrological processes and, in some areas, led to concentrations of salts on soil surfaces, in building materials, and waterways. Some Precincts are located within an area that is predisposed to developing salinity issues.

Although saline soils and groundwater are a natural part of the Australian landscape, land management practices are now increasingly recognised as significant contributors to the expansion of salt affected areas. In particular, urban salinity is increasingly occurring around populated areas due to clearing and site development.

Salinity occurs when salts found naturally in the soil or groundwater are mobilised. Capillary rise and evaporation concentrate the salt on, and close to, the ground surface. Urban salinity becomes a problem when the natural hydrogeological balance is disturbed by human interaction. This may occur in urban areas due to changes to the water balance, increases in the volume of water into a natural system altering subsurface groundwater flows and levels, exposure of saline soils, and removal of deep rooted vegetation reducing rates of evapotranspiration. Even small changes in sensitive areas can result in the balance being irrecoverably altered and salinisation occurring.

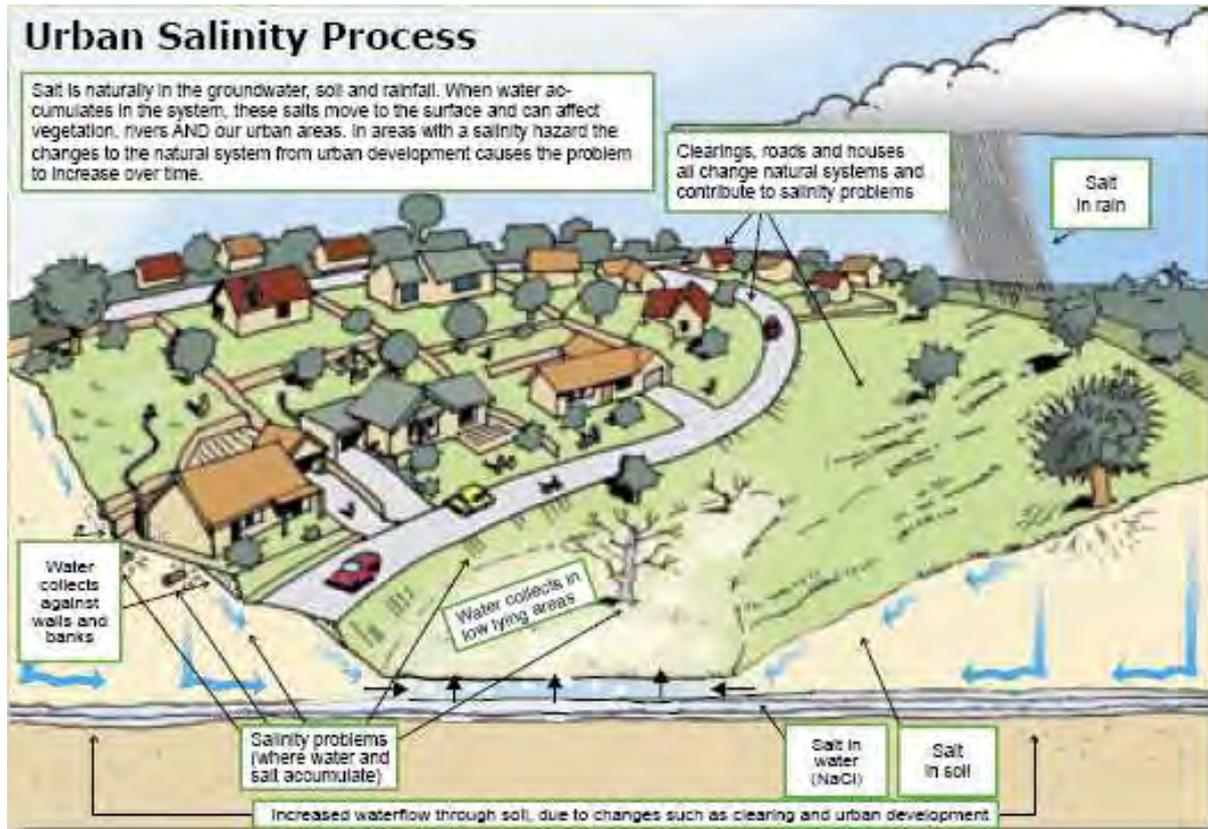
Some building methods may also contribute to the process of urban salinity. In particular, compacted surfaces and filling can restrict groundwater flow and result in a concentration of salt in one area. Cutting into slopes for building can result in saline soils or ground water being exposed and intercepted. The use of imported fill material may be an additional source of salt or the filling may be less permeable, preventing good drainage. These issues may also result in problems with the design and construction of roads. In particular, the building of embankments and the compaction of layers can interfere with groundwater flow. Also the inappropriate positioning, grading and construction of drains can result in surface and groundwater mixing and stagnant pools forming that evaporate leaving salt encrusted ground.

Salinity issues may also arise as the result of cumulative impacts. A common example is from the gradual removal of vegetation across a site, which can contribute to a change in the hydrological regime from reduced evapotranspiration, a consequential rise in the ground water table, and subsequent salinity problems. Where vegetation is gradually removed the water table rises as a result of a smaller volume of water being used by the plants, allowing salts to be mobilised. Of more relevance in an urban landscape is the potential for an increase in

water inputs into the hydrological regime. These increased inputs commonly come from watering of gardens and playing fields, infiltration of storm water and sewage and other service leakage.

These inputs may seem minor on their own but their cumulative effects over time produce an elevated groundwater table and eventually high levels of salinity.

**Figure 1** (from "Good Housekeeping to Manage Urban Salinity" by the Department of Infrastructure Planning and Natural Resources) illustrates the urban salinity process and identifies situations where salinity problems can develop due to inappropriate planning and design.



**Figure 1:** The Urban Salinity Process (DIPNR)

### 1.3 Effects of Salinity in an Urban Environment

Excess salinity in an urban environment can result in significant problems. It can manifest itself in a number of ways.

The effects of salinity can be observed in damage to building materials, infrastructure including pipework and roads and in death or poor health of vegetation. The effect of urban salinity is the result of both physical and chemical actions of the salt on concrete, bricks and metals. Salt moves into the pores of concrete and bricks and becomes concentrated when the water evaporates and can result in breakdown of materials and corrosion. Evidence of this may include crumbling, eroding or powdering of mortar or bricks, flaking of brick facing and cracking or corrosion of bricks.

High levels of salinity can result in damage to and even death of plants. Signs that vegetation is under stress from salinity include the discolouration and wilting of leaves and the death of less salt tolerant plant species. It may also be hard to establish lawns in areas that are subject to high salinity.

High levels of salinity may also affect soil structure, chemistry and productivity. This can reduce plant growth which in turn alters soil structure, chemistry and nutrient levels. As soils become more saline, plants and micro-organisms decline and soil structure deteriorates.

Water logging may also occur following a decline in nutrient levels. Over time, the alteration of soil structure can lead to the formation of gullies and other forms of soil erosion.

Salinity may also result in the corrosion of steel pipes, structural steel and reinforcement and can damage underground service pipes resulting in significant financial costs.

While limited groundwater was observed during the site investigations, these conditions may potentially change in periods of heavy downpour. Damage to pipes has the potential to exacerbate the problem by further recharging the aquifer.

Salinity can also have a significant effect on buildings and associated infrastructure where cutting and filling exposes buildings/structures to elevated salinity levels. This may include:

- degradation of bricks, concrete, road base and kerbing materials leading to expansion, cracking, strength and mass loss;
- corrosion of reinforcement and loss of structural integrity;
- rising/falling damp; and
- non-structural impacts, such as efflorescence on bricks.

These impacts can be prevented, minimised, or mitigated by the implementation of appropriate management measures as outlined in the Salinity Management Plan in **Section 3**.

## 2 Salinity Hazard Assessment

The SMEC Land Capability and Contamination Study for Alex Avenue provides the results for soil samples analysed in the Alex Avenue Precinct. These results are based on limited sampling and the findings summarised in this section are indicative only of salinity conditions in the precinct. Further detailed salinity assessment investigation is required across much of the precinct to confirm salinity conditions and to identify appropriate management measures.

Surface soils across the site area were classified as non to slightly saline. Salinity levels generally increased with depth, with subsurface salinity levels still predominantly non to slightly saline, although a number of moderately saline locations exist from 1.0 metres below ground level. One location (AA4-1) was classified as very saline.

### 2.1 Salinity Risk Map

A **Salinity Risk Map** is shown in the relevant Precinct's Schedule and is divided into two general areas:

- Level 1 Areas: The salinity of the area is considered typical of western Sydney. Precautionary measures may be considered.
- Level 2 Areas: The salinity risk of the area is considered typical for creek line and floodplain areas in Western Sydney. This area has a moderate risk of being affected by salinity and precautionary measures should be taken.

In addition, areas of mild to moderately aggressive soils are indicated on the map. Precautionary measures must be taken and these are discussed in **Section 3.4**.

**Note:** *Studies are by no means detailed or comprehensive. Maps are an indication only and site specific studies at the DA stage are required to determine salinity conditions and appropriate management measures.*

## 3 Salinity Management Guidelines

### 3.1 Introduction

The Salinity Management Guidelines contain:

- general measures to consider across the site;
- measures applying to high risk areas;
- appropriate management strategies for the management of groundwater, site design and urban development;
- measures to be taken at various stages of development; and
- strategies and measures for specific works.

### 3.2 General Measures

The following general measures apply to all development within the Blacktown Growth Centre Precincts. Where there is an inconsistency, the specific controls in the following sections take precedence. All development should be in line with the Western Sydney Salinity Code of Practice 2004.

Note that the practices for managing salinity will differ depending on the type of land use that is proposed on the site. For example, practices for land zoned Open Space and Recreation will require different approaches than practices within the Local Centre and residential zones.

1. Filling areas are to be graded, revegetated and adequate surface drainage infrastructure installed as soon as practical to avoid excessive infiltration, minimise salt leaching and soil erosion.
2. Drainage infrastructure in vulnerable areas is to be installed as soon as practical to avoid excessive water infiltration, ponding of water on-site and salt leaching.
3. Watering or irrigation practices are to be managed to avoid excessive infiltration and water logging.
4. Pipes used for stormwater drainage should be sealed to minimise the risk of leakage.
5. Concrete of suitable strength and reinforcement cover is to be used for drainage structures and wherever contact with water and increased soil moisture is expected.
6. Exposure and disturbance of subsoil material must be reduced by minimising cut and fill.
7. Natural drainage patterns are to be maintained as far as practical.
8. Imported soil should be tested for salinity to avoid importing saline soils to the site.
9. Native plant species with minimal water requirements, tolerant to EC levels of 4000 $\mu$ S/cm to be selected for revegetation or plantings.

10. Drainage, sewerage and water infrastructure is to be regularly maintained and repaired to prevent leakages.
11. Groundwater extraction does not occur on the site.
12. Design and construction to be carried out in accordance with relevant Australian Standards, Building Codes and current 'Industry Best Practice' in regard to urban salinity.
13. Any imported fill must have its salinity levels tested and must not exceed a level of 2 deci-siemens per centimetre. Soils exceeding this level must not be imported onto the site.
14. Reversing or mixing the soil profile when undertaking cut and fill activities must be avoided. Soils must be replaced in their original order.
15. Native vegetation must be retained or restored on site where possible.
16. In seepage and discharge areas or areas with a high potential sulphate resistant building materials must be used.
17. In areas with sodic or saline B Horizons disturbance to the soil should be reduced and the exposure of building materials to the corrosive elements in these soils minimised. Appropriate construction techniques such as suspended slab or piling to encourage ventilation and prevent soil moisture from being forced up the walls of the structure should be used.
18. In case of all building materials the manufacturer's advice must be complied with regarding durability and correct use.
19. Sulphate resistant materials should be used for underground surfaces and roads or pavings.
20. Roads must have well designed sub surface drainage.
21. Roads and shoulder areas must be designed to drain surface water such that there is no excessive concentration of runoff or ponding which may result in water logging or additional recharge or groundwater. Road shoulders must also be sealed.
22. Surface drains should be provided along the top of batter slopes or greater than 2.5 metres height to reduce the potential for concentrated flows of water flows slopes which may cause scour. Well graded subsoil should be provided at the base of all slopes where there are road pavements below the slope to reduce the risk of water logging.
23. The addition of salts in the materials, fill or water used during construction must be limited.
24. A waterproof seal must be used on roads to minimise evaporation and the concentration of salt.
25. Road alignments should not intercept known salt affected or water logged areas.
26. Roads should not be designed in a manner that impedes the sub-soil flow or creates hydraulic pressure causing groundwater discharge.

27. Natural drainage patterns and infiltration rates must be maintained as far as practicable.
28. Drainage should not be designed to discharge to groundwater or salinity affected areas that is likely to cause increased water logging adjacent to the road or that concentrated surface runoff.
29. Detention basins and other measures must not leak and cause localised damp soil conditions or recharge to the groundwater.
30. Stormwater detention structures and other measures must be constructed with impermeable liners and avoid the infiltration of water into the surrounding landscape or groundwater above that which would naturally occur. If using a clay lining the possibility that on site clays may be saline should be investigated before they are used for this purpose. In these situations an impermeable geotech fabric may be preferable.
31. Materials and waters used in the construction of roads and fill embankments should be selected to contain minimal or no salt. Where it is difficult a capping layer of either topsoil or sandy materials should be placed to reduce capillary rise, act as a drainage layer and also reduce the potential for dispersive behaviour in the sodic soils.
32. Batter slopes should be compacted with control of the moisture content to optimum moisture content plus 2 per cent or otherwise over-filled, compacted and then trimmed back to the final alignment to minimise infiltration through the exposed filling betters and the potential resulting flushing of salts from the filling. If the later is to be carried out, the outer zone (3 metres) of the fill should be placed at optimum moisture content plus 2 per cent.

### **3.3 Groundwater Management**

The key to controlling salinity is to minimise the concentration of salinity by evaporative processes. Care should also be taken to avoid raising the groundwater tables, as this is likely to result in an increased surface expression of salinity and may lead to water logging and groundwater infiltration into underground infrastructure.

Some general measures to reduce the volume of discharge into the aquifer and reduce risk of rising groundwater tables are:

1. Avoid over-watering of lawns, parks and other landscaped areas.
2. Minimise the number of shallow open pools that can readily dry out;
3. Plant native vegetation that utilises rainfall efficiently and minimise lawn areas on land not required for recreational uses. Landscape with native trees, shrubs and grasses that require little irrigation.
4. Appropriate design, construction and maintenance of water supply, sewage and stormwater pipes to avoid leaking.
5. Ensure an appropriate ratio of hard (impermeable) and permeable surfaces to avoid rainwater runoff infiltrating the ground in large volumes at any given location.

6. Direct runoff from paved areas into lines stormwater drains rather than along grassed channels as necessary.
7. Line or locate any ponds higher in the landscape to avoid recharge where proximity to the water table is likely to create groundwater mounding.
8. Avoid or minimise the use of on site stormwater detention.
9. Ensure any trunk stormwater detention infrastructure is appropriately designed and constructed.
10. Ensure adequate surface drainage for all development, including proper geotechnical assessments of planned drainage basins, artificial wetlands and recreational waterbodies.

### **3.4 High Risk Areas**

In areas identified as having a high salinity risk on either the Salinity Hazard Map or site specific studies or for development in close proximity to creek lines the following measures must be taken:

1. Detailed sampling and testing of soils and groundwater is required to confirm current salinity conditions and identify any risks that may be posed by development, as part of the design of subdivisions. A salinity assessment report is to be submitted with subdivision DA's in high risk areas.
2. Reduced development densities are to be considered to reduce pressure on groundwater in catchment areas.
3. unless site specific testing shows otherwise and/ or other management measures can be shown to achieve sufficient protection, floor slabs are to:
  - be elevated above ground level; and
  - have a minimum concrete strength of 32MPs.
4. existing riparian corridors are to be maintained and revegetated.
5. detailed salinity investigations are to be undertaken prior to development or the installation of infrastructure and the recommended management measures are to be implemented.

### **3.5 Site Design**

Control methods for management of salinity during site development should start with adherence to careful stripping and separation of non-saline topsoil from slightly and moderately saline subsoils. Soils must be replaced in the original order where possible to avoid bringing salts to the surface.

The A and top of the B (i.e. B1) horizon are generally not saline and should be recovered and stockpiled separately. The lower B (i.e. B2) and C horizons are generally the more saline layers and where exposed need to be covered with say 100 - 200 mm of B1 then 100 - 200 mm of topsoil (A) for landscape finishes. Building platforms should be capped with 100 - 200 mm of B1 horizon non saline subsoil.

Precautionary measures in subdivision design to reduce the potential for salinity problems include:

1. avoiding water collecting in low lying areas, along shallow creeks, floodways, in ponds, depressions, or behind fill embankments or near trenches on the uphill sides of roads. This can lead to water logging of the soils, evaporative concentration of salts, and eventual breakdown in soil structure resulting in accelerated erosion;
2. roads and the shoulder areas should be designed to be well drained, particularly with regard to drainage of surface water. There should not be excessive concentrations of runoff or ponding that would lead to water logging of the pavement or additional recharge to the groundwater. Road shoulders should be included in the sealing program;
3. surface drains should generally be provided along the top of batter slopes of greater than 2.5 m height to reduce the potential for concentrated flows of water down slopes possibly causing scour. Well graded subsoil drainage should be provided at the base of all slopes where there are road pavements below the slope to reduce the risk of water logging;
4. where possible materials and waters used in the construction of roads and fill embankments should be selected to contain minimal or no salt. This may be difficult for cuts and fills in lower areas where saline soils are exposed in cut or excavated then placed as filling. Under these circumstances where salinisation could be a problem, a capping layer of either topsoil or sandy materials should be placed to reduce capillary rise, act as a drainage layer and also reduce the potential for dispersive behaviour in the sodic soils;
5. to minimise infiltration through the exposed filling batters and the potential resulting flushing of salts from the filling, it is suggested that the batter slopes be specifically compacted to the requirements as described above but with control of the moisture content to OMC + 2% or otherwise over-filled, compacted and then trimmed back to the final alignment. If the latter is to be carried out, the outer zone (say 3 m wide) of the filling should be placed at OMC + 2%;
6. gypsum should be mixed into filling containing sodic soils and cuts where sodic soils are exposed on slopes to improve soil structure and to minimise erosion potential;
7. consideration could be given to planning to use deeper infrastructure service lines, deeper than say 1.2 m, to promote subsurface drainage by incorporating slotted drainage pipes fitting into the stormwater pits in lower areas where pipe invert levels are within about 1 m of existing groundwater levels. This is probably likely to be more appropriate where good drainage can be planned as in certain situations poorly graded subsoil drainage and water collecting in pits may make things worse raising the water table and increasing the risk of salinisation;
8. salt tolerant grasses and trees should be considered close to the creek and in areas of moderate and greater salinity to reduce soil erosion and to stabilise the soils and creek banks as well as maintain the existing evapotranspiration and groundwater levels. Reference should be made to an experienced landscape planner or agronomist. Advice from landscape technologists is that a wide range of indigenous and native species are available that will tolerate the anticipated level of salinity.

## 3.6 Residential and Other Buildings

Figure 3 presents diagrammatically a selection of salinity management tips for domestic dwellings.

The extent of measures adopted during construction in particular the concrete and masonry requirements should depend on the particular level of salinity of aggressivity at the actual site. Based on measurements and observations to date, it is anticipated that extreme salinity protection measures, such as increased durability concrete, barrier membranes, pier and beam, etc will not be required over most of the building areas. Nevertheless, for the construction of buildings on moderately or more saline sites, the following controls are to be implemented:

1. Soil from building sites in areas suspected to be more than slightly saline ( $EC_e > 4$  dS/m) should be sampled, tested and classified for soil salinity and aggressivity. This should preferably be carried out by a geotechnical consultant at the same time the site is classified for soil reactivity (shrink – swell behaviour as described in Australian Standard 2870 – 1996 Residential slabs and footings). The salinity classification would involve limited additional testing of soil or water samples for pH, electrical conductivity, total dissolved solids (TDS), sodicity, and possibly sulphates and chlorides.
2. On moderately or more saline sites, a thick layer of sand (say 100 mm minimum) followed by a membrane of thick plastic should be placed under the concrete slab to act as a moisture barrier and drainage layer to restrict capillary rise under the slab. Alternatively concrete grade of at least N25 and minimum 45 mm reinforcement cover should be adequate in moderately saline areas increasing to N32 and 50 mm cover respectively for very saline ( $EC_e$  from 8 to 16 dS/m) areas.
3. The need for higher than normal strength concrete and use of sulphate resistant cement should be considered in potentially highly saline ( $EC_e > 16$  dS/m) or aggressive areas in order to reduce the risk reinforcement corrosion in concrete slabs. A minimum of 55 mm of concrete cover on slab reinforcement, proper compaction and curing concrete are also suggested to produce a dense low permeability concrete.
4. As an alternative to slab on ground construction, suspended slab or pier and beam construction should be considered, particularly on sloping sites as this will minimise exposure to potentially corrosive soils and reduce the potential cut and fill on site which could alter subsurface flows.
5. Other measures that can be considered to improve the durability of concrete in saline environments should be considered. These include reducing the water cement ratio (hence increasing strength), minimising cracks and joints in plumbing on or near the concrete, reducing turbulence of any water flowing over the concrete and using a quality assurance supplier.
6. It is essential that in all masonry buildings that a brick damp course be properly installed so that it cannot be bridged either internally or externally. This will prevent moisture moving into brick work and up the wall.
7. As there are various exposure classifications and durability ratings for the wide range of masonry available, reference should be made to the supplier in choosing suitable bricks of at least exposure quality. Water proofing agents can also be added to mortar to further restrict potential water movement.

8. In high salinity areas, bricks that are not susceptible to damage from salt water should be used. These are generally less permeable, do not contain salts during their construction and have good internal strength so that they can withstand any stress imposed on them by any salt encrustation.
9. As indicated on **Figure 3**, service connections and stormwater runoffs should be checked to avoid leaky pipes which may affect off site areas lower down the slope and increase groundwater recharge resulting in increases in groundwater levels.

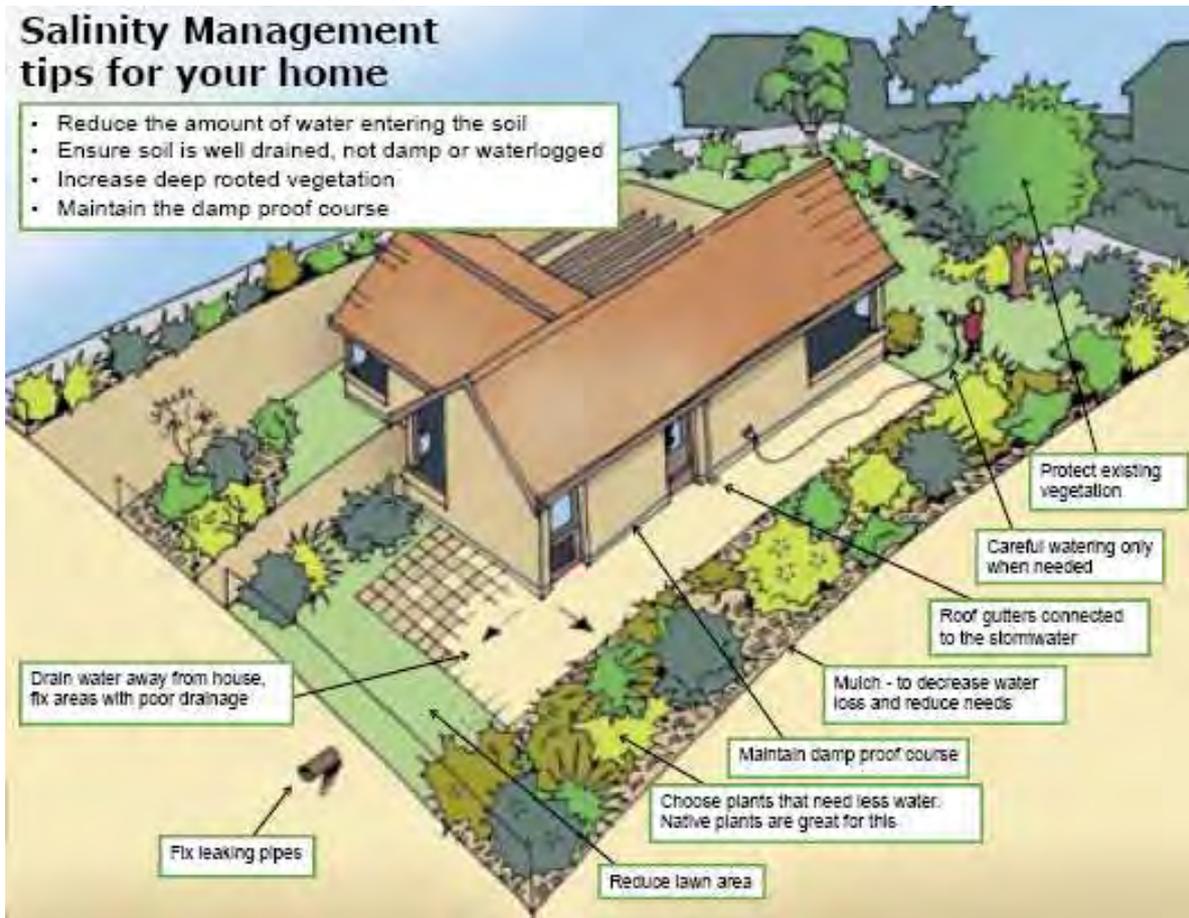


Figure 3: Salinity Management at Home (DIPNR)

### 3.7 Measures for Specific Assets

**Table 1** summarises salinity management measures that are to be applied to the planning, design and construction of specific categories of assets in the Alex Avenue Precinct.

**Table 1:** Salinity management measures for specific assets

Asset	Stage	Measure
Infrastructure and Utilities (Road Pavement, Drainage, Pipes, Structures, Pits, Substations, Duct Crossings, Sewer and Water Pipes)	Precinct Planning	<ul style="list-style-type: none"> <li>▪ Consider appropriate site selection to prevent structural degradation; and</li> <li>▪ Avoid low lying areas and areas near creek lines.</li> </ul>
	DA	<ul style="list-style-type: none"> <li>▪ Design and size drainage infrastructure to reduce the intensity of local and regional flooding.</li> <li>▪ Ensure appropriate embankment designs.</li> <li>▪ Design systems to avoid the interception of surface flow or groundwater recharge.</li> </ul>
	DA/construction	<ul style="list-style-type: none"> <li>▪ Avoid the use of materials such as clay and brass for piping.</li> <li>▪ Ensure sufficient clearance to groundwater.</li> <li>▪ Install appropriate subsoil drainage.</li> <li>▪ Use materials of appropriate strength and cover for reinforcement.</li> <li>▪ Avoid the disturbance of natural drainage patterns where possible. If this is not possible then realign drainage lines as close to natural patterns as possible.</li> </ul>
	Post-development	<ul style="list-style-type: none"> <li>▪ Maintain and repair to minimise leakages.</li> </ul>
Landscaping and Existing Vegetation	DA/Construction/ Post Development	<ul style="list-style-type: none"> <li>▪ Retain and/or establish the use of native salt-tolerant species, especially if deep rooted to minimise irrigation requirements.</li> <li>▪ Line waterbodies to minimise groundwater discharge.</li> <li>▪ Avoid overwatering of lawns, gardens and parklands.</li> <li>▪ If possible, use 'smart' sprinkler systems or subsoil drip/capillary action systems and maintain them regularly.</li> <li>▪ Carry out site specific investigations into the potential impacts of recycled water use and implement the recommendations of these studies.</li> <li>▪ Ensure that existing riparian corridors are maintained.</li> </ul>

<p>Miscellaneous (Floor Slabs, Masonry Walls, Foundations, Carparks)</p>	<p>DA/Construction</p>	<ul style="list-style-type: none"> <li>▪ Ensure sufficient clearance to groundwater or install subsoil drainage.</li> <li>▪ Avoid disturbance of the natural drainage pattern.</li> <li>▪ Damp proof courses and vapour barriers are to be properly installed where applicable and maintained to ensure they are not breached by later additions.</li> <li>▪ Use admixtures for waterproofing and corrosion prevention.</li> <li>▪ On ground level, provide a sand/gravel layer of sufficient depth under the slab.</li> <li>▪ Install appropriate membranes under slabs and ensure that they are extended to the outside face of the external edge beam up to the finished ground level.</li> <li>▪ Use concrete of appropriate strength and cover for reinforcement.</li> <li>▪ For floor slabs, ensure that concrete is of the appropriate strength and cover for reinforcement and are properly cured. The following requirements apply: <ul style="list-style-type: none"> <li>▪ minimum strength of 25MPs where the slab is at ground level</li> <li>▪ cover must be at a reinforcement height of: <ul style="list-style-type: none"> <li>▪ 50mm from unprotected ground</li> <li>▪ 30mm from a membrane in contact with the ground</li> <li>▪ 50mm for strip footings and beams irrespective of the use of a damp proof membrane</li> </ul> </li> </ul> </li> <li>▪ Ensure that damp proof course consists of adequate material and is correctly placed.</li> <li>▪ Ensure that exposure class masonry units are used below any damp proof course, including for strip footings, and that appropriate mortar and mixing ratios are used.</li> <li>▪ Select foundation type and material in according with Australian Standards with consideration of soil aggressivity.</li> <li>▪ Allow for sufficient corrosion of steel or install the appropriate protective systems.</li> <li>▪ Use permeable paving where practical.</li> </ul>
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<p>Earthworks (Excavations, Cut and Fill, Re-contouring and Stockpiling)</p>	<p>Construction</p>	<ul style="list-style-type: none"> <li>▪ Revegetate and provide surface drainage as quickly as practical</li> <li>▪ Install adequate erosion controls such as silt fences during excavation and until site stabilisation.</li> <li>▪ Avoid excavation intersecting the groundwater, where possible.</li> <li>▪ Ensure imported fill is non/slightly saline.</li> <li>▪ Place cut materials in the original in-situ order, or if this is not possible, bury the most saline soil underneath less saline soil.</li> <li>▪ Monitor runoff from stockpiles and conduct the appropriate tests to determine whether gypsum should be added.</li> <li>▪ Ensure that stockpiles have adequate controls in place for erosion, covering and stabilisation.</li> </ul>
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## 4 References

Douglas Partners Pty Ltd and Sydney Environmental and Soil Laboratory. 1998. Salinity Management Report for Second Ponds Creek. Report to Blacktown City Council and Landcom.

DPNR. 2002. Salinity Potential in Western Sydney.

SMEC Testing services. SMEC Land Capability and Contamination Report. Report to the Growth Centres Commission. Alex Avenue, Schofields, 16407/3816B, August 2007.)

Western Sydney Regional Organisation of Councils (WSROC). 2003. Western Sydney Salinity Code of Practice

# Appendix D

## Prescribed Trees and Preferred Species



# 1 Prescribed Trees and Preferred Species

1. A prescribed tree is identified as:
  - having more than 4 metres in height and having a trunk diameter of more than 200 millimetres when measured at height of 1 metre from the ground.
  - a tree identified as one of the species listed in **Table 1**.
2. Consent is not required:
  - for clearing species listed in **Table 2** or any other species which have been declared as noxious plants under the *Noxious Weeds Act 1993*;
  - for the removal of torn limbs or dead wood, such as individual branches, but not including whole trees, or
  - for pruning of less than 10% of the canopy or root system up to once every growing season and only of branches less than 100 millimetres in diameter, or
  - for pruning of more than 10% but less than 25% of the canopy, where the work will be undertaken by a suitably qualified person and Council has been notified of the work, and up to once every growing season, or
  - when inserting root barriers, when this will result in less than 10% of the root system being removed and up to once every growing season,
3. Pruning of prescribed trees is only acceptable if:
  - all work complies with the Australian Pruning Standards AS 4373-1996, and
  - any pruning will not result in harm to the health of the tree.

**Table 1: Preferred Species**

Scientific Name	Common Name	Mature Height	Mature Spread	Native
<b>Prescribed Trees</b>				
<i>Acer buergeranum</i>	Trident Maple	6m	3m	X
<i>Agonis flexuosa</i>	Willow Myrtle	14m	6m	√
<i>Angophora floribunda</i>	Rough Barked Apple	20m	6m	√
<i>Banksia integrifolia</i>	Coastal Banksia	20m	6m	√
<i>Casuarina glauca</i>	Swamp She-Oak	15m	5m	√
<i>Corymbia maculata</i>	Spotted Gum	30m	8m	√
<i>Eucalyptus amplifolia</i>	Cabbage Gum	30m	5m	√
<i>Eucalyptus crebra</i>	Narrow Leafed Red Ironbark	30m	8m	√
<i>Eucalyptus microcorys</i>	Tallow-wood	40m	8m	√
<i>Eucalyptus moluccana</i>	Grey Box	30m	8m	√
<i>Eucalyptus tereticornis</i>	Forest Red Gum	40m	4m	√
<i>Fraxinus 'Raywoodii'</i>	Claret Ash	20m	8m	X
<i>Jacaranda mimosifolia</i>	Jacaranda	20m	8m	X
<i>Melaleuca linarifolia</i>	Snow In Summer	10m	4m	√

Scientific Name	Common Name	Mature Height	Mature Spread	Native
Melaleuca nodosa	Ball Honeymyrtle	4m	2.5m	√
Melaleuca stypheloides	Prickly Paperbark	10m	3m	√
Melia azedarach	White Cedar	15m	5m	X
Sapium sebiferum	Chinese Tallow Tree	7m	3m	X
<b>Shrubs</b>				
Agapanthus orientalis	Agapanthus	0.75m	0.4m	X
Acemena smithii 'Hedge Master'	Lilly Pilly	2m	1m	√
Anigozanthos flavidus	Tall Kangaroo Paw	2m	1m	√
Banksia spinulosa	Hairpin Banksia	3m	2m	√
Brunoniella australis	Blue Trumpet	0.3m	0.4m	√
Bursaria spinosa	Tasmanian Christmas Bush	10m	6m	√
Callistemon linariifolius	Narrow-leaved Bottlebrush	3.5m	2m	√
Crinum pedunculatum	Crinum Lily	2.5m	2.5m	√
Dietes bicolor	Fortnight Lily	1.0m	0.75m	X
Doryanthes excelsa	Gynea Lily	3m	2m	√
Dodenea viscosa	Giant Hop Bush	3m	3m	√
Gardenia augusta	Common Gardenia	1.5m	1.0m	X
Grevillea poorinda "Royal Mantle"	Grevillea	1.5m	1.5m	√
Hakea sericea	Silky Hakea	6m	3m	√
Kunzea ambigua	Tick Bush	2.5m	2m	√
Micromyrtus ciliata	Fringed Heath Myrtle	0.15m	1.5m	√
Phormium tenax "Purpureum"	NZ Purple Flax	1.0m	1.0m	X
Thryptomene saxicola	Rock Thryptomene	1m	0.5m	√
Westringia fruticosa	Coastal Rosemary	2.0m	1.5m	√
<b>Ground Cover</b>				
Aspidistra elatior	Cast Iron Plant	1m	0.8m	X
Brachycome multifida	Cut Leaf Daisy	0.3m	1m	√
Dichondra repens	Kidney Weed	0.1m	0.3m	√
Grevillea 'Bronze Rambler'	Grevillea cultivar	0.3m	0.4m	√
Hardenbergia violacea	Purple Coral Pea	climbs to 1.5m	1.5m	√
Trachelospermum jasminoides	Star Jasmine	climbs to 6m	1.5m	X
Viola hederacea	Native violet	0.2m	0.5m	√

Scientific Name	Common Name	Mature Height	Mature Spread	Native
Wahlenbergia gracilis	Australian Bluebell	0.3m	0.25m	√
<b>Grasses</b>				
Aristida ramosa	Wire Grass	0.5m	0.5m	√
Danthonia tenuoir	Wallaby Grass	0.3m	0.3m	√
Imperta cylindrica	Cogon Grass	0.5m	0.5m	√
Liriope muscari	Turf Lily	0.6m	0.5m	X
Microlaena stipoides var. stipoides	Microlaena	0.5m	0.3m	√
Ophiopogon japonicus	Mondo Grass	0.35m	0.3m	X
Pennisetum alopecuroides	Fountain Grass	1m	1m	√
Poa labillardieri	Poa	0.4m	0.25m	√
Themeda australis	Kangaroo Grass	1m	0.3m	√
<b>Sedges/Rushes</b>				
Carex appressa	Tall Sedge	1m	0.5m	√
Dianella caerulea	Flax Lily	0.5m	0.3m	√
Dianella revolute	Flax Lily	1m	1m	√
Gahnia aspera	Saw Sedge	1m	0.4m	√
Isolepis nodosa	Nobby Clubrush	1m	1m	√
Lomandra longifolia	Mat Rush	0.7m	1m	√
Lomandra multiflora	Many Flowered Mat Rush	0.7m	0.7m	√
Juncus usitatus	Common Rush	1m	0.4m	√
<b>Turf</b>				
Cynodon dactylon	Couch (improved types)	-	-	X

*Note: It is important to note that this plant list is indicative only to provide a guide on the range of suitable plants for the region with consideration of functional, aesthetic, salt tolerance and horticultural requirements. The selection of species is expected to vary over time as a result of species availability, site conditions, and plant viability.*

## 2 Undesirable species

Table 2: Undesirable Species

Scientific Name	Common Name
Bambusa	Bamboo
Eriobotrya	Loquat
Ficus Elastica	Rubber tree
Ligustrum	Large and small leaf Privet
Musa	Banana plant
Toxicodendron Succedaneum	Rhus or Wax tree
Morus	Mulberry
Arecastrum romanzoffianum Schefflera	Umbrella tree
Persea	Avocado
Ailanthus	Tree of heaven
Lagunaria Patersonia	Norfolk Island hibiscus
genus Cotoneaster	Cotoneaster
genus Erythrina	Coral tree
Cinnamomum camphora Ligustrum spp.	Camphor Laurel
Pinus radiata, Pinus elliotii	Radiata Pine
genus Salix	Willow
Mangifera Indica	Mango tree

# Appendix E

## **Crime Prevention Through Environmental Design**



# Crime Prevention through Environmental Design

## Objectives

- To implement principles of design that eliminate opportunities for crime
- To ensure that the siting and design of buildings and spaces decreases the opportunities for committing crime through casual surveillance.
- To assist Council in assessing development applications that may have significant impacts on the community.
- To create well designed and defensible environments that contribute to public safety (both real and 'perceived').
- To ensure that development encourages people to use streets, parks and other public places without fear of personal risk.
- To encourage a sense of community ownership of open and public spaces through the adequate and continuing maintenance of the built environment and the appropriate design of publicly accessible areas.

## Controls

	Performance Criteria	Design Requirements
a. <b><u>Fencing</u></b>	<ul style="list-style-type: none"> <li>• Fence design should maximise natural surveillance from the street to the building and from the building to the street, and minimise the opportunities for intruders to hide.</li> </ul>	<ol style="list-style-type: none"> <li>1. Fences should not inhibit surveillance of the communal areas, pathways and footpath by occupants of the building. Both the height of the fence in relation to the building, as well as the nature of the construction materials need to be considered.</li> <li>2. Front fences should preferably be no higher than 1 metre. Where a higher fence is proposed, it will only be considered if it is constructed of open materials e.g. spaced pickets, wrought iron etc.</li> <li>3. If noise insulation is required, install double-glazing at the front of the building rather than a high solid fence (greater than 1 metre).</li> </ol>
b. <b><u>Blind Corners</u></b>	<ul style="list-style-type: none"> <li>• Avoid blind corners in pathways, stairwells, hallways and car parks.</li> </ul>	<ol style="list-style-type: none"> <li>1. Pathways should be direct. All barriers along pathways should be permeable including landscaping, fencing etc.</li> <li>2. Consider the installation of mirrors to allow users to see ahead and around corners.</li> <li>3. The installation of glass or stainless steel panels in stairwells can also assist in this regard.</li> </ol>

	<b>Performance Criteria</b>	<b>Design Requirements</b>
<b>c. <u>Communal/Public Areas</u></b>	<ul style="list-style-type: none"> <li>Provide natural surveillance for communal and public areas.</li> </ul>	<ol style="list-style-type: none"> <li>Position active uses or habitable rooms with windows adjacent to main communal/public areas, e.g. playgrounds, swimming pools, gardens, car parks etc.</li> <li>Communal areas and utilities e.g. laundries and garbage bays should be easily seen.</li> <li>Where elevators or stairwells are provided, open style or transparent materials are encouraged on doors and/or walls of elevators/stairwells.</li> <li>Waiting areas and entries to elevators/stairwells should be close to areas of active uses, and should be visible from the building entry.</li> <li>Seating should be located in areas of active uses.</li> <li>Supermarkets and other stores that provide shopping trolleys should provide an incentive scheme for their return or a retrieval service.</li> </ol>
<b>d. <u>Entrances</u></b>	<ul style="list-style-type: none"> <li>Provide entries that are clearly visible and avoid confusion.</li> </ul>	<ol style="list-style-type: none"> <li>Entrances should be at prominent positions.</li> <li>Design entrances to allow users to see into the building before entering.</li> <li>Entrances should be easily recognisable through design features and directional signage.</li> <li>Minimise the number of entry points – no more than 6 to 8 dwellings should share a common building entry.</li> <li>If staff entrances must be separated from the main entrance, they should maximise opportunities for natural surveillance from the street.</li> <li>Avoid blank walls fronting the street.</li> <li>In industrial developments, administration/offices should be located at the front of the building.</li> </ol>
<b>e. <u>Site and Building Layout</u></b>	<ul style="list-style-type: none"> <li>Allow natural observation from the street to the dwelling, from the dwelling to the street, and between dwellings.</li> </ul>	<ol style="list-style-type: none"> <li>For single dwellings and dual occupancies, orientate the main entrance towards the street or both streets if located on a corner.</li> <li>For townhouses/villas/multiple units, ensure part of the building addresses the street or both streets</li> </ol>

	Performance Criteria	Design Requirements
		<p>if located on a corner.</p> <ol style="list-style-type: none"> <li>3. Position habitable rooms with windows at the front of the dwelling.</li> <li>4. Garages and carports should not dominate the front façade of the building.</li> <li>5. Access to dwellings or other uses above commercial/retail development should not be from rear lanes.</li> <li>6. Offset windows, doorways and balconies to allow for natural observation while protecting privacy.</li> </ol>
<b>f. <u>Landscaping</u></b>	<ul style="list-style-type: none"> <li>• Avoid landscaping which obstructs casual surveillance and allows intruders to hide.</li> <li>• Avoid large trees/shrubs and buildings works that could enable an intruder to gain access to the dwelling or to neighbouring dwellings.</li> <li>• Use vegetation as barriers to deter unauthorised access.</li> </ul>	<ol style="list-style-type: none"> <li>1. Avoid medium height vegetation with concentrated top to bottom foliage. Plants such as low hedges and shrubs, creepers, ground covers and high canopied vegetation are good for natural surveillance.</li> <li>2. Trees with dense low growth foliage should be spaced or raised to avoid a continuous barrier.</li> <li>3. Use low ground cover or high canopied trees, clean trunks, to a height of 2m around children's play areas, car parks and along pedestrian pathways.</li> <li>4. Avoid vegetation, which conceals the building entrance from the street.</li> <li>5. Prickly plants can be used as effective barriers. Species include bougainvilleas, roses, succulents, and berberis species.</li> <li>6. Avoid large trees, carports, skillion extensions, fences, and downpipes next to second storey windows or balconies that could provide a means of access.</li> </ol>
<b>g. <u>Lighting</u></b>	<ul style="list-style-type: none"> <li>• Providing lighting to enable natural surveillance, particularly in entrances/exits, service areas, pathways and car parks.</li> </ul>	<ol style="list-style-type: none"> <li>1. Use diffused lights and/or movement sensitive lights.</li> <li>2. Direct these lights towards access/egress routes to illuminate potential offenders, rather than towards buildings or resident observation points.</li> <li>3. Lighting should have a wide beam of illumination,</li> </ol>

	<b>Performance Criteria</b>	<b>Design Requirements</b>
	<ul style="list-style-type: none"> <li>Ensure lighting does not produce glare or dark shadows.</li> </ul>	<p>which reaches to the beam of the next light, or the perimeter of the site or area being traversed.</p> <ol style="list-style-type: none"> <li>Avoid lighting spillage onto neighbouring properties as this can cause nuisance and reduce opportunities for natural surveillance.</li> <li>As a guide areas should be lit to enable users to identify a face 15 metres away.</li> <li>Illuminate possible places for intruders to hide.</li> <li>Use energy efficient lamps/fittings/switches to save energy.</li> <li>Leave some lights on at night or use sensor lights.</li> <li>Locate additional lighting below awnings to provide adequate illumination to the footpath areas.</li> </ol>
<b>h. <u>Building Identification</u></b>	<ul style="list-style-type: none"> <li>Ensure dwellings are clearly identified by street number to prevent unintended access and to assist persons trying to find the dwelling.</li> </ul>	<ol style="list-style-type: none"> <li>Each individual dwelling should be clearly numbered.</li> <li>Unit numbers should be clearly provided on each level.</li> <li>Each building entry should clearly state the unit numbers accessed from that entry.</li> <li>Street numbers should be at least 7cm high, and positioned between 1m and 1.5m above ground level on the street frontage.</li> <li>Street numbers should be made of durable materials preferably reflective or luminous, and should be unobstructed (e.g. by foliage).</li> <li>Location maps and directional signage should be provided for larger developments.</li> </ol>
<b>i. <u>Security</u></b>	<ul style="list-style-type: none"> <li>Provide an appropriate level of security for individual dwellings and communal areas to reduce opportunity for unauthorised access.</li> <li>Use security hardware</li> </ul>	<ol style="list-style-type: none"> <li>Install intercom, code or card locks or similar for main entries to buildings including car parks.</li> <li>Install quality locks on external windows and doors.</li> <li>Install viewers on entry doors to allow residents to see who is at the door before it is opened.</li> <li>Main entry doors for buildings should be displayed</li> </ol>

	<b>Performance Criteria</b>	<b>Design Requirements</b>
	and/or personnel to reduce opportunities for unauthorised access.	<p>requesting residents not to leave doors wedged open.</p> <ol style="list-style-type: none"> <li>5. <i>Australian Standard 220</i> - door and window locks should be installed in all dwellings.</li> <li>6. Consider installing user/sensor electronic security gates at car park entrances, garbage areas and laundry areas etc, or provide alternative access controls.</li> <li>7. Entry to basement parking should be through security access via the main building.</li> <li>8. External storage areas should be well secured and well lit.</li> <li>9. If security grills are used on windows they should be operable from inside in case of emergencies.</li> <li>10. Ensure skylights and/or roof tiles cannot be readily removed or opened from outside.</li> <li>11. Consider monitored alarm systems.</li> <li>12. Provide lockable gates on side and rear access.</li> <li>13. Consider building supervisors or security guards.</li> </ol>
<b>j. <u>Ownership</u></b>	<ul style="list-style-type: none"> <li>• Design dwellings and communal areas to provide a sense of ownership.</li> <li>• Create the impression that the place is well looked after and well “cared for”.</li> </ul>	<ol style="list-style-type: none"> <li>1. To distinguish dwellings or groups of dwellings use design features e.g. colouring, vegetation, paving, artworks, fencing, furniture etc. Physical and/or psychological barriers, e.g. fences, gardens, lawn strips, varying textured surfaces can be used to define different spaces.</li> <li>2. Ensure the speedy repair or cleaning of damaged or vandalised property.</li> </ol>
<b>k. <u>Maintenance</u></b>	<ul style="list-style-type: none"> <li>• Create the impression that the place is well looked after and well “cared for”.</li> <li>• Use materials that reduce the opportunity for vandalism.</li> </ul>	<ol style="list-style-type: none"> <li>1. Ensure the speedy repair or cleaning of damaged or vandalised property.</li> <li>4. Provide for the swift removal of graffiti.</li> <li>5. Provide information advising where to go for help and how to report maintenance or vandalism problems.</li> <li>6. Strong, wear resistant laminate, impervious glazed ceramics, treated masonry products, stainless</li> </ol>

	<b>Performance Criteria</b>	<b>Design Requirements</b>
		<p>steel materials, anti-graffiti paints and clear over sprays will reduce the opportunity for vandalism. Flat or porous finishes should be avoided in areas where graffiti is likely to be a problem.</p> <p>7. Where large walls are unavoidable, consider the use of vegetation or anti-graffiti paint.</p> <p>8. Alternatively, modulate the wall, or use dark colours to discourage graffiti on vulnerable walls.</p> <p>9. External lighting should be vandal resistant. High mounted and/or protected lights are less susceptible to vandalism.</p> <p>10. Communal/street furniture should be made of hardwearing vandal resistant materials and secured by sturdy anchor points or removed after hours.</p>
<b>i. <u>Mixed Land Uses</u></b>	<ul style="list-style-type: none"> <li>Where permitted, provide appropriate mixed uses within buildings to increase opportunities for natural surveillance, while protecting amenity.</li> </ul>	<p>1. Locate shops and businesses on lower floors and residences on upper floors. In this way, residents can observe the businesses after hours while the residences can be observed by the businesses during business hours.</p> <p>2. Encourage 'Multiple uses' of land to encourage activity that complements casual surveillance.</p> <p>3. Incorporate car wash services, taxi ranks and shop kiosks etc within car parks.</p>
<b>m. <u>Spaces</u></b>	<ul style="list-style-type: none"> <li>Spaces should be clearly defined to express a sense of ownership and reduce illegitimate use/entry.</li> </ul>	<p>1. Physical and/or psychological barriers, e.g. fences, gardens, lawn strips, varying textured surfaces, can be used to define different spaces.</p>
<b>n. <u>Public Facilities</u> (ATMs telephone, help points, bicycle storage etc)</b>	<ul style="list-style-type: none"> <li>Locate public services in areas of high activity.</li> </ul>	<p>1. Locate public facilities in highly visible locations that are well lit and, where possible, near activities with extended trading hours e.g. restaurants, convenience stores.</p> <p>2. Locate public facilities away from possible places to hide, e.g. fire exits.</p> <p>3. Design ATMs to incorporate mirrors or reflective materials so that users can observe people</p>

	<b>Performance Criteria</b>	<b>Design Requirements</b>
		<p>behind.</p> <p>4. Provide directional signs to key services and landmarks, e.g. railway station, taxi ranks, library etc.</p>
<b>o. <u>Shopfront</u></b>	<ul style="list-style-type: none"> <li>Allow for natural surveillance and a suitable streetscape appearance.</li> </ul>	<ol style="list-style-type: none"> <li>Shopfronts should remain consistent with or improve on the existing streetscape</li> <li>Ensure surveillance between the shopfront and the street by retaining clear sight lines and limiting promotional material on windows.</li> <li>Avoid displaying merchandise on the footpath.</li> </ol>
<b>p. <u>Building Materials</u></b>	<ul style="list-style-type: none"> <li>Use building materials, which reduce the opportunity for intruder access.</li> </ul>	<ol style="list-style-type: none"> <li>Use toughened or laminated glass at ground floor.</li> <li>Roller shutters should be in the form of an opaque or clear security grille rather than a solid material.</li> </ol>
<b>q. <u>Hours of Operation</u></b>	<ul style="list-style-type: none"> <li>Provide adequate security to buildings with extended hours of operation.</li> </ul>	<ol style="list-style-type: none"> <li>Allocate security guards to patrol the surrounding areas of the building, and instruct patrons when they leave the building to be mindful of residential uses in close proximity and to keep noise levels down.</li> </ol>

## Car Parks

These requirements apply to commercially operated car parks, Council and commuter car parks, and to car parks associated with retail, commercial, industrial and other uses.

	Performance Criteria	Design Requirements
a) <b><u>Lighting</u></b>	<ul style="list-style-type: none"> <li>Provide adequate lighting.</li> </ul>	<ol style="list-style-type: none"> <li>Illuminate all external edges and access points to car parks during opening hours of the car park.</li> <li>To allow for the adjustment of driver and pedestrian vision, lighting intensity to covered or underground car parks should be graded. Brighter light should be used at entrance and pedestrian access ways and dimmer light should be used elsewhere.</li> <li>Lighting should be sufficiently bright to enable a car park user to see into the rear seat of a parked car before they enter the car.</li> </ol>
b) <b><u>Materials</u></b>	<ul style="list-style-type: none"> <li>Use materials that enhance natural surveillance within the car park.</li> </ul>	<ol style="list-style-type: none"> <li>Encourage the use of transparent materials for walls and doors.</li> <li>Paint the ceilings and walls of the car park in light colours to enhance brightness.</li> <li>Reflective film can be used on windows overlooking car parks. Potential intruders will not know if they are being observed during daylight hours.</li> </ol>
c) <b><u>Security Grills</u></b>	<ul style="list-style-type: none"> <li>Allow natural observation.</li> </ul>	<ol style="list-style-type: none"> <li>Consider the installation of open style security grills to individual parking spaces rather than separate garaging.</li> <li>Where feasible include security grills from underground car parks to the street to provide some surveillance.</li> </ol>
d) <b><u>Site and Building Layout</u></b>	<ul style="list-style-type: none"> <li>Design car parks to allow for natural surveillance and ensure clear sight lines throughout the parking area.</li> <li>Ensure ease of access and safety within the car park.</li> </ul>	<ol style="list-style-type: none"> <li>Avoid large expanses of car parks. Where large expanses of car parks are proposed, provide surveillance such as security cameras.</li> <li>Access to lifts, stairwells and pedestrian pathways should be clearly visible.</li> <li>Avoid hidden recesses.</li> <li>Locate disabled parking spaces in highly visible and convenient areas.</li> </ol>

	<b>Performance Criteria</b>	<b>Design Requirements</b>
		<ol style="list-style-type: none"> <li>5. Locate car parks in areas that can be observed by adjoining uses.</li> <li>6. Minimise the number of entry and exit points.</li> <li>7. Pedestrian corridors should be created for large developments.</li> <li>8. Where possible, locate entry/exit points in close proximity and close to the car park operator or shops, cafes etc.</li> <li>9. Staff car park should be separated and secured.</li> </ol>
<b>e) <u>Security</u></b>	<ul style="list-style-type: none"> <li>• Provide security and reduce opportunity for unauthorised access.</li> </ul>	<ol style="list-style-type: none"> <li>1. Use security devices, such as an intercom or remote lock facility in multi level car parks where appropriate.</li> <li>2. For larger developments, locate a help point on each parking level and/or allocate security staff.</li> <li>3. For a multi level car park, use only a limited area of the car park outside peak hours.</li> <li>4. Consider the installation of boom gates or similar devices at entrances and exits of the car park.</li> </ol>
<b>f) <u>Signage</u></b>	<ul style="list-style-type: none"> <li>• Ensure that parking areas are clearly identified by signage to prevent unintended access and to assist persons trying to find their car.</li> </ul>	<ol style="list-style-type: none"> <li>1. Provide signage that is clearly visible, easy to read and simple to understand.</li> <li>2. Use strong colours, standard symbols and simple graphics for signs.</li> <li>3. Upon entering the car park provide both pedestrians and drivers with a clear understanding of direction to stairs, lifts and exits.</li> <li>4. In multi-level car parks, use creative signage to distinguish between floors to enable users to easily locate their cars.</li> <li>5. Advise users of security measures that are in place and where to find them e.g. intercom systems.</li> <li>6. Provide signs at the car park advising users to lock their cars.</li> <li>7. Where exits are closed after hours, ensure this information is indicated at the car park entrance.</li> </ol>

# Appendix F

## Lodgement requirements



# Matrix of Development Application Lodgement Requirements

**Table 1** below provides an indicative checklist of the lodgement requirements for all development applications. For the specific documents required for a DA see **Table 2** and **3** below or contact Blacktown City Council.

**Table 1:** Matrix of Lodgement Requirements

Key: ✓ Required

Document	Subdivision DA	Building DA
A4 Notification Plan	✓	✓
Building Plans		✓
Bushfire Evacuation Plan	✓	✓
Completed DA form	✓	✓
Crime Risk Assessment Report (Safer by Design Evaluation)		✓
Landscape Plan	✓	✓
Materials Sample Board of external colours and finishes		✓
Noise and Vibration Impact Assessment		✓
Photomontages		✓
Scale model		✓
Shadow Diagrams		✓
Site Analysis Plan	✓	✓
Site Water Management Plan		✓
Statement of Environmental Effects	✓	✓
Subdivision Plans	✓	
Traffic Impact Report	✓	✓
Tree Survey Plan/Arborist Report	✓	✓
Waste Management Plan		✓

## Lodgement Requirements for Development Applications

Table 2 below provides a description of the lodgement requirements for all development applications.

**Table 2:** Lodgement requirements for DAs

Lodgement Requirement	Description
<b>A4 Notification Plan</b>	Site plan and elevations must be shown in an A4 document.
<b>Building Plans</b> (or subdivision plans – see below)	Building Plans must show dimensioned floor plans, elevations of all facades, including a schedule of external finishes, colours and textures, sections showing heights and finished ground levels.
<b>Completed DA form</b>	Signed by the owner(s) of the development site. This is to be lodged with the applicable DA fee.
<b>Site Analysis Plan</b>	<p>Site Analysis Plan must cover the relevant factors listed below:</p> <p>Site analysis should include plan and section drawings of the existing features of the site, at the same scale as the site and landscape plan, together with appropriate written material. Information may include but is not limited to:</p> <ul style="list-style-type: none"> <li>• Site dimensions, site areas, north point</li> <li>• Location of site in relation to shops, community facilities and transport</li> <li>• Form and character of adjacent and opposite buildings in the streetscape, including both sides of any street that the development fronts.</li> <li>• Location and use of any existing buildings or built feature on the site.</li> <li>• Location and important characteristics of adjacent public, communal and private open spaces</li> <li>• Location, use, overall height (storeys, metres) and important parapet/datum lines of adjacent buildings</li> <li>• Location and height of existing windows and balconies on adjacent properties facing the site</li> <li>• Location, height and characteristics of adjacent walls and fences</li> <li>• Location of natural features including watercourses, major trees on and other significant vegetation on site, on adjacent properties and street trees, identified by size and botanical or common names</li> <li>• Topography, showing spot levels and contours 0.5metre intervals for the site, adjoining streets and land adjoining the site</li> <li>• Views to and from the site</li> <li>• Prevailing winds</li> <li>• Orientation and overshadowing of the site and adjoining properties by neighbouring structures and trees</li> <li>• Geotechnical characteristics including salinity and groundwater conditions of the site and suitability of development</li> <li>• Pedestrian and vehicular access points (existing and proposed)</li> <li>• Location of utility services, including electricity poles, stormwater drainage lines, natural drainage, kerb crossings and easements</li> <li>• Location of any infrastructure easement of rights of way</li> <li>• Significant noise sources on and in the vicinity of the site, particularly vehicular traffic, train, aircraft and industrial operations noise</li> <li>• Assessment of site contamination , proposed remediation strategy and a statement from a recognised expert that the site can be remediated and made suitable for the proposed uses.</li> </ul> <p>As a minimum, the Plan should show the site location, boundary dimensions, site area, north point, existing vegetation and trees, location and uses of existing adjoining buildings, existing site levels to Australian Height Datum (AHD) and services.</p>

Lodgement Requirement	Description
<b>Statement of Environmental Effects</b>	The Statement of Environmental Effects must demonstrate how the proposal meets all relevant objectives and provision of Marsden Park Industrial Precinct DCP 2008 and should set out measures to be taken to mitigate any likely adverse impact of the proposal.
<b>Subdivision Plans</b> (or building plans – see above)	Subdivision Plans must show: <ul style="list-style-type: none"> <li>• Lot numbers</li> <li>• Lot sizes and dimensions</li> <li>• Lot orientation</li> <li>• Road names/numbers</li> <li>• Road layout</li> <li>• Road widths and locations</li> <li>• Locations of any traffic calming</li> <li>• Existing and proposed levels to AHD</li> <li>• Existing and proposed drainage</li> <li>• Drainage calculations including overland flow.</li> <li>• Any details of existing and proposed easements and services affecting or benefiting the subject land.</li> </ul>

**Table 3** below provides a description of the lodgement requirements for certain development applications.

**Table 3:** Lodgement requirements for specific DAs

Lodgement Requirement	Description	Required for
<b>Bushfire Assessment</b>	A Bushfire Assessment should be prepared in accordance with <i>Planning for Bush Fire Protection 2006</i>	DAs where the site is located on Bushfire Prone Land
<b>Contamination Assessment</b>	A Contamination Assessment should be prepared in accordance with SEPP 55 – Remediation of Land	DAs where the site has known contamination or has not been investigated for contamination.
<b>Crime Risk Assessment Report (Safer by Design Evaluation)</b>	A Crime Risk Assessment Report must be prepared for each development to demonstrate how it addresses the objectives and controls outlined in <b>Appendix E</b> <i>Crime Prevention through Environmental Design</i> of this DCP. The report should also demonstrate consistency with Safer by Design Guidelines (2002).	
<b>Drainage Plan</b>		
<b>Erosion and Sediment Control Plan</b>		
<b>Groundwater Assessment</b>		
<b>Landscape Plan</b>	Information on the Landscape Plan should include: <ul style="list-style-type: none"> <li>(a) north point;</li> <li>(b) scale;</li> <li>(c) contours and spot levels;</li> <li>(d) all parks and streets</li> <li>(e) main structures on the site (buildings, car parking, driveways and services areas,</li> </ul>	All Building DAs.

Lodgement Requirement	Description	Required for
	<p>walls, fences, paved areas, storage areas etc);</p> <p>(f) drainage structure and above ground water storage tanks;</p> <p>(g) existing trees to be removed or retained;</p> <p>(h) proposed planting areas;</p> <p>(i) proposed turfed areas;</p> <p>(j) plant species schedule including botanical and common names;</p> <p>(k) details of seating and other outdoor furniture including bins, bollards and signs;</p> <p>(l) details of paving, fencing, wall and edge treatments;</p> <p>(m) lighting;</p> <p>(n) irrigation systems and water requirements;</p> <p>(o) sections and/ or elevations where necessary to describe special features or alterations in levels; and</p> <p>(p) name and contact details of the landscape architect.</p> <p>The plan should identify:</p> <p>(q) Maintenance responsibilities of the landscaped areas should be defined whether by private or Council.</p> <p>(r) Any public open space areas to be maintained by Council need to be designed in accordance with Council's maintenance requirements.</p> <p>All streetscape designs within the Landscape Plan must be in accordance with RTA guidelines.</p>	
<b>Materials Sample Board of external colours and finishes</b>	A materials sample board must be submitted detailing external colours and finishes.	For Building DAs within the B5 Business Development, B7 Business Park and R3 Medium Density Residential Zones.
<b>Noise and Vibration Impact Assessment</b>	A Noise and Vibration Impact Assessment and Management Plan (NVIAMP) must be prepared by a suitably qualified consultant. It must provide an assessment of noise and vibration impacts and identify necessary mitigation measures to minimise the potential environmental impacts from noise and vibration generated by the proposed development.	For Building DAs adjacent to B
<b>Photomontages</b>	Colour photomontages of the proposed development in its context must be submitted.	Building DAs where Council deems it necessary.

Lodgement Requirement	Description	Required for
<b>Salinity Assessment</b>	<p>A Salinity Assessment must be prepared outlining what actions are proposed to minimise the impact of:</p> <ul style="list-style-type: none"> <li>• development on the saline environment. Such measures could include minimising/decreasing recharge to saline groundwater tables and waterlogged/evaporation areas by appropriate drainage, strategic tree planting and soil management strategies</li> <li>• the saline environment on development. Such measures could include drainage around buildings, fill rather than cut where practical, the use of building techniques and materials to resist saline attack, and moisture exclusion to prevent salt damage.</li> </ul>	<p>Subdivision DAs that involve physical works, including road works, pipes and drainage works or other earthworks.</p> <p>Building DAs where the subdivision salinity assessment requires further assessment at the building stage.</p>
<b>Scale model</b>	<p>A scaled model at either 1:100 or 1:200 of the proposed development should also include reference to adjoining properties.</p>	<p>Building DAs in the B7 Business Park zone where Council deems it necessary.</p>
<b>Shadow Diagrams</b>	<p>Shadow diagrams for 9am, 12 noon and 3pm at December 21, June 21 and March 21 shall be prepared for the B7 Business Park Zone only. For commercial and light industrial sites, shadow diagrams must be prepared demonstrating that communal areas receive 2 hours of solar access between 11am and 3pm on June 21. Such diagrams should be prepared by an appropriate professional, be based on a survey of the site and buildings on adjoining sites and include details of finished ground levels.</p>	
<b>Survey Plan</b>		
<b>Tree Survey/Arborist Report</b>	<p>The Tree Survey Plan/Arborist Report must identify existing trees, trees to be removed and trees to be retained.</p>	<p>Subdivision and Building DAs where Trees are proposed for removal.</p>
<b>Traffic Impact Report</b>	<p>Must address the traffic impacts of the proposal on the local road network within the precinct and assessing the adequacy of on-site parking.</p>	<p>Subdivision and Building DAs where the proposed development will generate a traffic impact.</p>
<b>Waste Management Plan</b>	<p>A Waste Management Plan must be submitted in accordance with Blacktown DCP 2006, Part O (Site Waste Management and Minimisation). The plans and/or accompanying documents (include the waste management plan) should include details of:</p> <ul style="list-style-type: none"> <li>• The volume and type of waste generated during construction and demolition</li> <li>• How waste is to be stored on site</li> <li>• Method of disposal of recyclable and residual waste</li> <li>• Ongoing management</li> <li>• Bin type, number, size</li> <li>• Location and design of waste storage areas/rooms (residential and commercial)</li> </ul>	<p>Building DAs where the proposed development will generate waste.</p>

Lodgement Requirement	Description	Required for
	<ul style="list-style-type: none"> <li>• Method and frequency of collection</li> <li>• Details of Garbage chutes, where applicable</li> <li>• Location of collection points for bin servicing</li> <li>• Responsibility for movement of bins from storage areas to collection points and retrieved after collection.</li> <li>• Responsibility for ensuring the system is maintained in a clean condition free of odour and vermin</li> <li>• Details on how contamination of the recycling will be minimised</li> <li>• Details of collection truck vehicle manoeuvring</li> </ul> <p>The WMP must demonstrate and achieve a diversion in the amount of waste generated by the development that is the subject of each application, going to landfill.</p>	
<b>Water Management Plan</b>	<p>A Water Management Plan must investigate, where feasible, provide for the integrated management and use of water. The Water Management Plan should demonstrate that other water sources have been considered including:</p> <ul style="list-style-type: none"> <li>• an integrated water collection and recycling system for capturing and recycling of roof water;</li> <li>• the reuse of grey water on site;</li> <li>• the capture and re-use of stormwater from the site;</li> <li>• Where possible, treating and re-using any water generated by the development; and</li> <li>• controlling the quality of waste water and stormwater from the site.</li> </ul>	<p>Building DAs within the B5 Business Development, B7 Business Park and R3 Medium Density Residential Zones.</p>