

Part



Pemulwuy Industrial Controls

Holroyd Development
Control Plan 2013

Pemulwuy Industrial

Contents

1.	Introduction & Vision	771
2.	Public Domain and Open Space	774
	2.1. Open Space	774
	2.2. Pedestrian and Cyclist Facilities	776
	2.3. Entrance Treatment	777
	2.4. Street Trees & Furniture	777
	2.5. Safety and Security	777
3.	Building and Siting Requirements	779
	3.1. Land Uses	779
	3.2. Lot Sizes and Site Cover	779
	3.3. Siting	780
	3.4. Solar Access	783
	3.5. Building Heights and Design	784
	3.6. External Materials and Colours	786
	3.7. Energy and Water Efficiency	787
	3.8. Landscaping	789
	3.9. Signage	791
	3.10. Fencing	793
	3.11. Exempt and Complying Development	793
4.	Transport	794
	4.1. Principles for a Transport Plan	794
	4.2. Regional Transport Requirements	795
	4.3. Transport Design Guidelines - Land Use Location	795
	4.4. Access and Circulation	796
	4.5. Parking	798
	4.6. Service Areas	799
	4.7. Public Road Design	800
	4.8. Public Transport	802
	4.9. Pedestrian and Cycle Routes	803
5.	Heritage	805
	5.1. Guiding Principles	805
	5.2. Archaeology	805
	5.3. European Cultural Heritage	806
	5.4. Prospect Hill State Heritage Registered Area	807
6.	Biodiversity	808
	6.5. Biodiversity in Development Areas	808
	6.6. Fauna Movement Corridors	811
7.	Environmental Management	812
	Appendix A- Stormwater Management Plan	826

Pemulwuy Industrial

I. Introduction & Vision

Land Covered by this Part of the DCP

This Part of the DCP relates only to the Pemulwuy North Employment Lands, the land shown in Figure I. The entirety of the site is within Holroyd local government area (LGA). This DCP does not apply to the whole of the Greystanes Precinct that was defined in the State Environmental Planning Policy No. 59 - Central Western Sydney Economic and Employment Area (SEPP 59). Lands not included are: the residential land within Pemulwuy, parts of the Employment Lands in Blacktown LGA, and the 'Greystanes Southern Employment Lands' (as defined by the 20/07/2007 Part 3A Determination). Also, the southeast boundary of the former CSIRO lands has been redefined to reflect the landowners' intended uses for the lands here. Therefore, this Section of the DCP applies only to some of the employment component of the Greystanes Precinct that was defined in SEPP 59. It also includes the north-west corner industrial land (Lot 101 DP 8517851, Lot 9 DP 374325 and public road reserve) originally excluded from SEPP 59. It also includes the eastern half of Clunies Ross Street linking the two industrial lands, as this is part of the WSEA SEPP 2009 land.

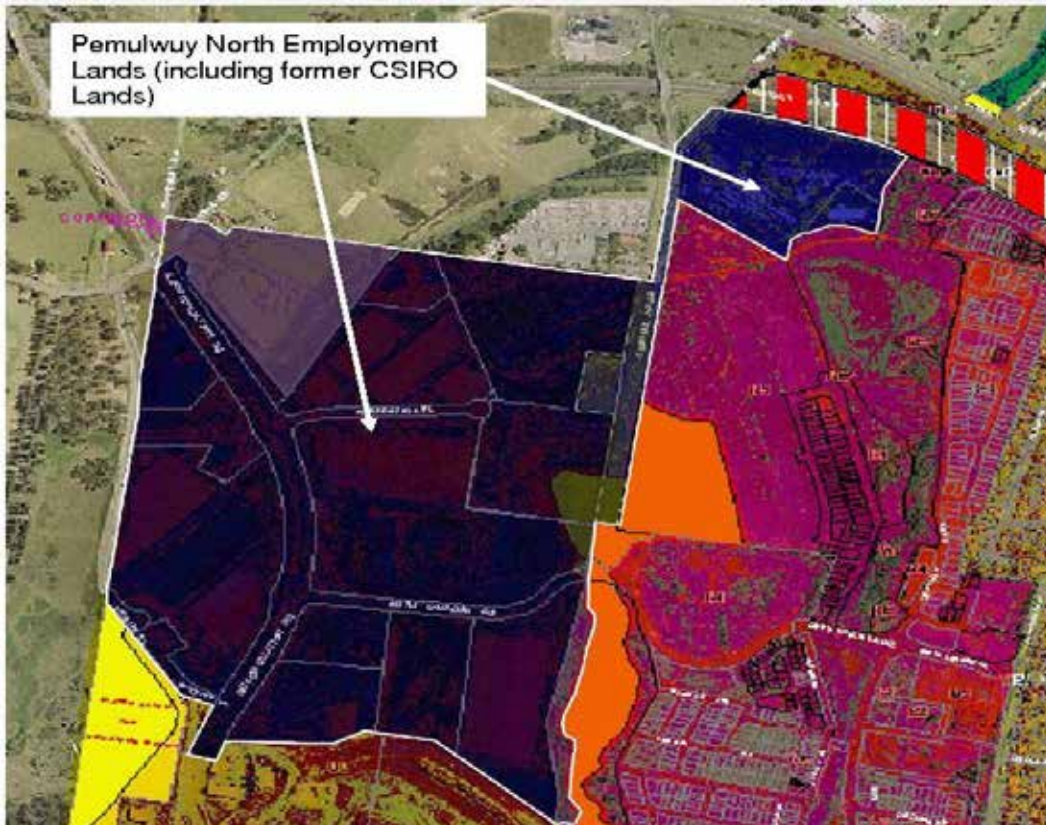


Figure I- Lands application map- Pemulwuy Northern Industrial lands

Pemulwuy Industrial

Relationship to Other Plans

State Environmental Planning Policy No. 59 - Central Western Sydney Economic and Employment Area (SEPP 59) was gazetted In February 1999, and applied to a number of landholdings in Western Sydney including the Greystanes Estate. The SEPP rezoned the Greystanes Estate for urban development including employment generating and residential land uses and establishes the planning framework for the development of the land.

As a result of to the gazettal of the State Environmental Planning Policy (Western Sydney Employment Area) 2009 (WSEA SEPP) on Friday 21 August, 2009, control of the Employment Lands of SEPP59 was transferred to the WSEA SEPP. Most of the land that is the subject of this section of the DCP is controlled by the WSEA SEPP.

As required now under clause Part 4 (Development control plans) of the WSEA SEPP, prior to the lodgement of a development application for the site, the owner or Council needs to prepare a Development Control Plan for the site pursuant to section 80 (11) of the E&P A Act 1979 and consistent with the issues of consideration in Schedule 4 of the WSEA SEPP (Requirements relating to preparation and content of development control plans), and then have it determined (approved) by the Director-General of the Department of Planning.

This section of the Holroyd Development Control Plan 2013 (HDCP) provides guidance on specific development matters pertinent to the land defined in Section 1.1 above, and is consistent with Schedule 4 of the WSEA SEPP. Infrastructure services are not addressed by this DCP, having been provided prior to the adoption of this control.

Where this section of the HDCP does not provide guidance on specific development matters, reference shall be made to other sections of Holroyd DCP 2013, such as Part A (General Guidelines), Parts C (Business Development), Part D (Industrial Development), and Council Codes and Policies. The objectives and controls of these plans will be considered in the determination of the Development Application. Where there is an inconsistency between this Part and Part A or D, this Part should take precedence.

Historically, this section of the Holroyd Development Control Plan 2013 was amalgamated from relevant sections of two Precinct Plans:

- Former CSIRO Site Pemulwuy Employment Lands
- Greystanes Estate SEPP 59 Residential Lands.

These Precinct Plans continue to apply to the subject land of Pemulwuy, except where there is an inconsistency between this Development Control Plan and these Precinct Plans, in which case this DCP prevails to the extent of the inconsistency.

Note: Lot 63 DP 752051, on the western side of Clunies Ross Street, Pemulwuy, was formerly part of the SEPP 59 land, though it had not been included in the Greystanes Estate Precinct Plan.

Pemulwuy Industrial

Objectives

- O1.** To achieve the principles of ESD through:
 - i) provision of a range of new employment opportunities;
 - ii) efficient re-use of degraded land;
 - iii) proximity of local employment to workforce and the consequent benefits to the community such as reduced travel time, promotion of healthy lifestyles, reduced expenditure for transport;
 - iv) energy efficient design of employment developments;
 - v) provision of public transport networks;
 - vi) implementation of sustainable practices, where practicable e.g. water efficiency and conservation measures to reduce water consumption, maintenance or improvement of water quality through a catchment management approach to the site and the control and minimisation of air pollutant emissions;
 - vii) efficient use of land to minimise urban growth and better utilise existing infrastructure;
 - viii) promoting the use of appropriate and renewable source materials;
 - ix) maintaining and enhancing the significant vegetation and habitat and protecting threatened ecological communities; and
 - x) recognising and integrating significant cultural and archaeological features/aspects.
- O2.** To continue existing employment;
- O3.** To offer new job opportunities in Western Sydney. The accessibility of the site to a regional road and public transport network will assist in attracting new employment generating industries.
- O4.** To provide within the public domain of the Pemulwuy north employment lands:
 - riparian corridor,
 - water bodies,
 - paths and cycleways, and
 - roads.
- O5.** To design these areas so as to create a unique setting and encourage development throughout the Estate.

Note: For a vision of Residential Pemulwuy, see Section 1.4 of Part P - Pemulwuy Residential Controls.

Pemulwuy Industrial

2. Public Domain and Open Space

2.1. Open Space

Objectives

01. To protect scenic values and ridge skyline;
02. To create an integrated open space system that is safe, visually attractive, environmentally sustainable, manageable and flexible to cater for changing community needs;
03. To retain significant vegetation bands and corridors including the dominant north-south wooded ridgeline; and
04. To rehabilitate existing quarry batters to provide a vegetated setting for employment lands.
05. To create a major northern gateway to the employment lands of high quality landscape that reflects the character of the entire employment area.

Development Controls

- C1. Provide open space generally in accordance with the development concept set out in Figure 2. The public domain should comprise: riparian corridor, water bodies, paths and cycleways, and roads. The treatment of these areas will be important in creating a unique setting and encouraging development throughout the Estate. These areas are to be reflected in subsequent development applications for the site, and maintained as such.
- C2. Open space areas may be used for stormwater detention purposes.
- C3. Open space may include elements of the natural environment and provide for active and passive recreation.
- C4. Retain and reinforce existing vegetation patterns through the Open space landscaping within public domain areas.
- C5. On the north-south wooded ridgeline, replace the pine plantation with new locally indigenous planting to protect the skyline.
- C6. Provide a cross site link to allow for connection between Greystanes and Prospect Reservoir.
- C7. Provide pedestrian and cycle systems through the riparian corridor where possible, designed to minimise the impact on the ecology of the riparian corridor.
- C8. Design accessible open space corridors to ensure the safety of pedestrians and cyclists using the corridors as thoroughfares. See Section 2.1.5.
- C9. Maintain and vegetate the riparian corridor in accordance with the agreement with the relevant State authority and to the satisfaction of Holroyd City Council.
- C10. Create a major northern gateway to the employment lands of high quality landscape that reflects the character of the entire employment area, as shown in Figure 3.
- C11. Provide a linear open space area with water elements, landscaped areas and suitably designed signage, bridge, lighting and pavements to evoke the character and theme of a quality industrial park.
- C12. Along the eastern ridgeline, plant to reinforce the topographical bounds of the employment area.

Pemulwuy Industrial

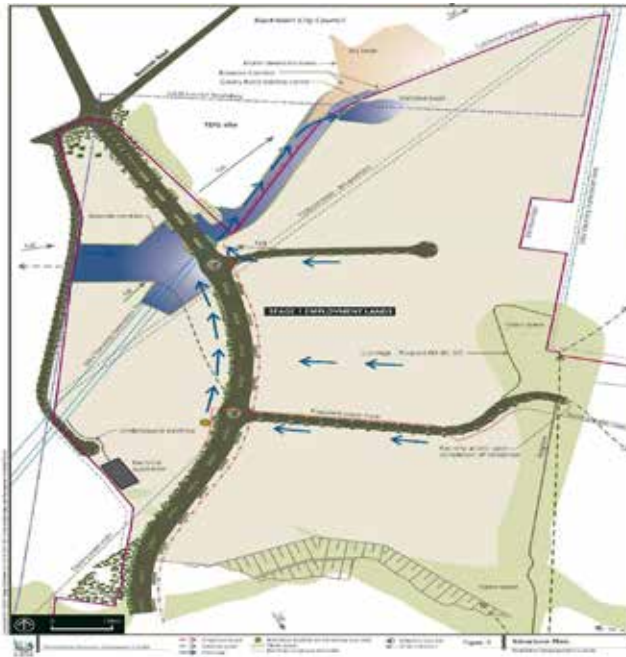


Figure 2- Open Space concept Plan



Figure 3: Illustration- Entry into Employment lands

2.2. Pedestrian and Cyclist Facilities

Objectives

- O1. To provide a convenient access to the employment precinct .
- O2. To encourage walking and cycling by providing safe, convenient and legible routes to points of attraction within and beyond the suburb.
- O3. To provide open space permeability through development precincts.
- O4. To link the existing Greystanes community with new development precincts.
- O5. To utilise natural drainage systems and vegetation corridors as open space links.

Development Controls

- C1. Construct pedestrian footpaths generally as part of the normal street network, other than paths in open space corridors.
- C2. Ensure that development applications that relate to the cycle network and pedestrian link the site facilities to the off-site facilities The cycle network is a combination of on street, dedicated street lanes, shared paths (parks and streets) and dedicated paths (parks) that link the main points of attraction, particularly the residential and employment areas and village centre with the open space network including the Prospect Canal linear park and Hyland Park.
- C3. Provide key pedestrian and cycle routes broadly along the alignment shown on Figure 3.
- C4. Align cycle/foot paths in open space approximately parallel with the park edge streets wherever possible to take advantage of the street lighting and allow for casual surveillance by residents and drivers.
- C5. Wherever possible and practical, design and construct footpaths or shared paths to be of appropriate width, longitudinal gradient, sight distance and kerb details to cater for the likely population and user types, including aged people, people with prams and wheelchairs, and people with disabilities. Provide a minimum width of 1200mm and maximum gradient where possible of 15%.
- C6. Consider incorporating drainage lines into the open space networks as pedestrian and cycle paths.
- C7. Pedestrian and cyclist access to the north east employment area will be via the main gate onto Clunies Ross Street.
- C8. Pedestrian access to private land should be designed as an integral part of the internal circulation network.

Pemulwuy Industrial

2.3. Entrance Treatment

Objectives

01. To create distinctive, high quality, landscaped gateways to the Estate.

Development Controls

- C1. Establish north and south entry gateways into the northern employment lands along the spine road to create a distinctive character.
- C2. Locate the site entry to the northeast area on Clunies Ross Street and integrate it with the landscape character.

2.4. Street Trees & Furniture

Objectives

01. To establish a character and unifying element through street tree planting and furniture.

Development Controls

- C1. Use thematic street tree planting to complement the role of streets. Use different species for different street types and orientation.
- C2. Use a co-ordinated palette of street furniture throughout the Estate.
- C3. Ensure that lighting in public areas is of a style, colour and form that is compatible with the street furniture.
- C4. Co-ordinate the spacing of light poles with street trees.

2.5. Safety and Security

Objectives

01. To promote the feeling of safety.

Development Controls

- C1. Design buildings to overlook public and communal streets and other public areas to provide casual surveillance.
- C2. Through site planning, buildings, fences, landscaping and other features, clearly define territory and ownership of all public, common, semi-private and private space.
- C3. Provide appropriate lighting to all pedestrian paths between public and shared areas, parking areas and building entries, and light building entries to provide a sense of security for both residents and visitors.
- C4. Ensure no lighting spills onto or affects the amenity of residential areas.
- C5. Use robust materials which are aesthetically pleasing in public or communal spaces.

Pemulwuy Industrial

- C6.** Ensure pedestrian site access and carparking are:
- clearly defined,
 - appropriately lit,
 - visible to others and
 - provide direct access to buildings from areas likely to be used at night.
- C7.** Design major pedestrian, cycle and vehicle thoroughfares to:
- minimise opportunities for concealment;
 - avoid 'blind' corners;
 - maximise casual surveillance; and
 - allow 'long distance' sight lines.
- C8.** Identify major pedestrian, cycle and vehicle thoroughfares, and reinforce them as 'safe routes' through:
- appropriate lighting;
 - the potential for casual surveillance;
 - minimised opportunities for concealment;
 - landscaping which allows long-distance sight lines; and
 - avoidance of 'blind corners'.
- C9.** Site and design landscape and fencing so they do not present a security risk by screening doors, windows and major paths.
- C10.** Provide safety fencing along the ridge line, suitably designed to allow for views and outlook.
- C11.** Ensure landscaping maintains view corridors & clear sight lines.

3. Building and Siting Requirements

Where this section of the Holroyd DCP 2013 does not provide guidance on specific development matters, reference should be made to other sections of the DCP, such as Part A (General Guidelines), and Part D (Industrial Development). Where there is an inconsistency between this Part and Part A or D, this Part should take precedence.

3.1. Land Uses

Objectives

01. The objectives for and land uses permissible within the Pemulwuy North Employment Lands are defined by:
The WSEA SEPP 2009 (in relation to land zoned IN 1 as defined by that SEPP); and
The Holroyd Local Environmental Plan 2013 (in relation to land zoned IN 2 and excluded from Precinct 10 of the Land Application Map of the WSEA SEPP 2009).

Development Controls

- C1. Provide a retail service centre catering for the needs of the workforce at a central location within the employment lands. Locate the centre on a corner allotment facing the north-south spine road so that it is readily accessible to the local workforce . For Hours of Operation, see clause 6.2 of Part D of this DCP.
- C2. Provide recreational and community uses within the employment lands consistent with the provisions of the Western Sydney Employment Area SEPP 2009.
- C3. Ensure open space that provides active and passive recreation for the workforce. Open space should be readily accessible and well located and should be incorporated within individual developments as well as along public corridors.
- C4. Restrict retail activity on industrial land (having the potential to increase land prices and effectively push traditional industrial users out, and to threaten the industrial 'address' and image).

3.2. Lot Sizes and Site Cover

Objectives

01. To achieve a quality industrial park setting and ensure adequate provision is made for landscaping, parking and manoeuvring areas.
02. To create site layouts which consider the opportunities and constraints of the site.

Development Controls

- C1. Ensure a minimum lot size of 1 hectare, although, a range of lot sizes is anticipated to meet market demand.
- C2. Subdivisions of land should:
 - seek to maximise solar access to all parts of the development;
 - encourage passive solar design; and
 - protect site attributes such as views, existing vegetation and other environmental features.

Pemulwuy Industrial

- C3. Subdivision of land should avoid the creation of battle-axe blocks or long and narrow blocks at right angles to street frontages.
- C4. Maximum site coverage is 60%. Local services including commercial, retail, community and recreational uses are excluded from this provision given the different design characteristics of these uses.
- C5. “Site area” is defined as the whole of the land to which an application relates and includes areas set aside for open space, drainage and other services. “Site coverage” is defined as the area of a site covered by buildings including awnings.
- C6. In the layout of the site, design the buildings and landscaping to provide direct, convenient and safe access to the street for the pedestrians.
- C7. On industrial sites, make adequate allowance for manoeuvring and turning of heavy vehicles on site. In accordance with the Roads and Maritime Service’s Policies, Guidelines and Procedures for Traffic Generating Developments, apply the design standard for “large rigid truck”.
- C8. Ensure that the width of an industrial allotment at the building line is equal to or greater than 24m and the average depth is equal to or greater than 45m.

3.3. Siting

Objectives

- O1. To achieve attractive streetscapes.
- O2. To provide a quality setting and to allow for landscaped curtilages between buildings and front property boundaries.
- O3. To create setbacks that allow for landscaping and visual amenity.
- O4. To provide solar access to sites and adjacent development.
- O5. On the former CSIRO lands, to create a consistent streetscape with the residential area along the Clunies Street frontage.
- O6. On the former CSIRO lands, to provide a setback on the southern boundary that allows for reasonable sunlight access and reduces visual dominance of employment buildings to the rear of the residential area.
- O7. To prescribe Asset Protection Zones (APZs) within the Pemulwuy northern employment lands for bushfire protection.

Development Controls

- CI. Setback buildings to the west of Clunies Ross Street as follows:
 - North-south spine road – buildings are to be setback 20 metres from the property boundary. The first 10 metres is to be landscaped in accordance with the Landscape section below;
 - all other roads - buildings are to be set back 8 metres from the property boundary. The first 3 metres is to be landscaped in accordance with the Landscape section below.

Pemulwuy Industrial

- C2.** Setback buildings within the former CSIRO employment land consistent with figure 4.
- C3.** within the former CSIRO employment land:
- The Eastern Building Setback is the prescribed flood line based on the dam break Imminent Failure Flood (IFF) line;
 - New buildings are not permitted in the IFF zone;
 - Carparking and like uses are permitted in the IFF zone;
 - New buildings are not permitted within the Asset Protection Zone (APZ).
 - No new development, including buildings, car parking, fire trails and like activities, is permitted within the riparian corridor alignment agreed with a State environmental authority.
- C4.** The setback controls may be varied where:
- a predominant street building line exists;
 - the current setback of buildings is staggered and continuity in street building line should be maintained;
 - there is no obvious street building line and new buildings should align with existing maximum and minimum building lines of development;
 - public domain improvements or environmental benefits such as solar access, protection of vegetation are achieved; or
 - where the building is located on a corner site and a lesser setback is consistent with streetscape objectives.
- C5.** Setback buildings 10 metres from any public open space, including riparian reserves, and 20 metres from Greystanes Creek.
- C6.** Site and design buildings to allow for casual surveillance of building entrances and the street.
- C7.** Site buildings to allow for adequate lines of sight to building entrances, the street and carpark areas for pedestrians, cyclists and vehicles.
- C8.** Locate offices to address and activate the street/s. The warehouse/factory functions as well as car parking, manoeuvring areas, loading and unloading facilities are to be located within the site.
- C9.** Through layout of the site, the design of buildings and landscaping, provide direct and safe access to the street for pedestrians.
- C10.** Large setbacks with significant car parking in front of buildings are not permitted on the principal street frontage.
- C11.** Establish and maintain landscaping within the southern setback of the former CSIRO employment land.
- C12.** Site and design buildings so that solar access to staff recreation areas on site and in adjoining developments is not compromised between 12 noon and 2pm (as measured at 21 June).
- C13.** Site buildings to satisfy maintenance, utility and safety requirements.

Pemulwuy Industrial

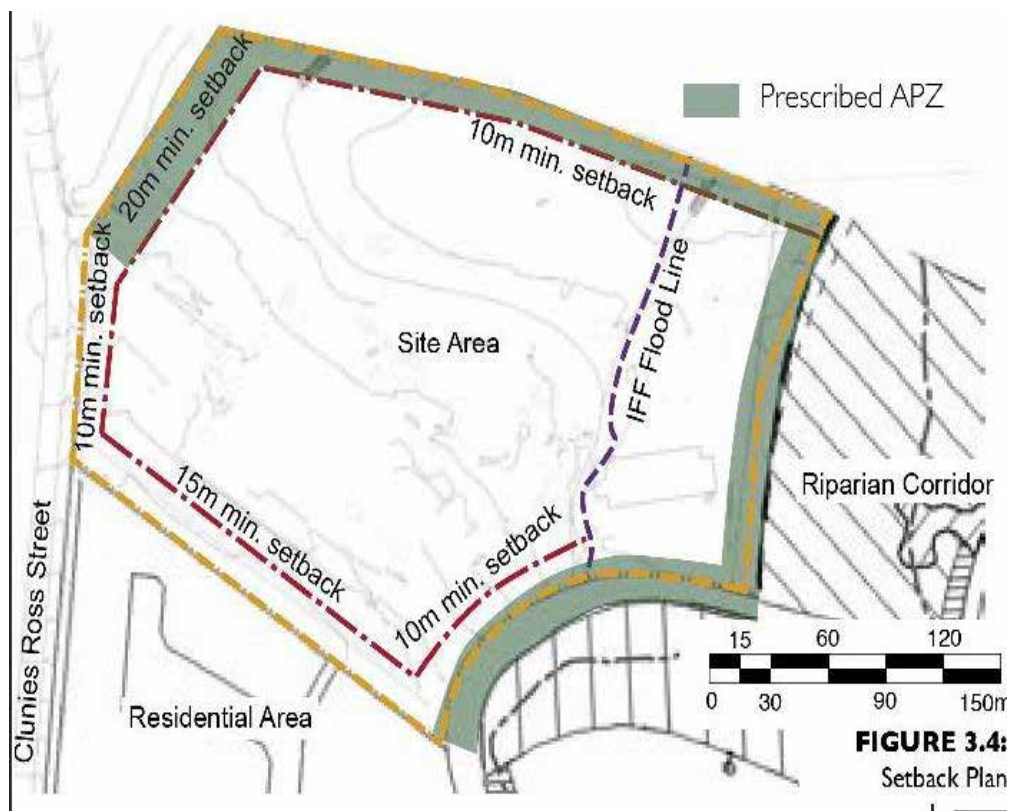


FIGURE 3.4:
Setback Plan

Figure 4- Setbacks- Former CSIRO employment land

Pemulwuy Industrial

3.4. Solar Access

Objectives

- O1. To consider mid winter solar access to the office building areas within the Employment Land.
- O2. To achieve reasonable mid winter solar access to primary indoor spaces and primary private open spaces within the residential area to the immediate south of the former CSIRO employment land.

Development Controls

- C1. Design office areas to consider north/south orientation in order to maximise solar access to the habitable area in midwinter.
- C2. Site and design buildings so that solar access to staff recreation areas on site and in adjoining developments is not compromised between 12 noon and 2pm (as measured at 21 June).
- C3. Within the former CSIRO employment land, ensure that the residential development to the immediate south of the employment area achieves a minimum 4 hours of direct sunlight to windows of the north facing living areas between 8.00am and 4.00pm midwinter, and 3 hours direct sunlight between 9.00am and 3.00pm to 50% of the private open space in mid winter.

Note: Accompanying development applications, submit shadow diagrams showing the effect of shadows on public open space, adjoining properties and outdoor recreation areas at 9am, 12 noon and 3pm mid winter.

- C4. Where industrial development abuts residential lots or streets, shadow diagrams shall
 - a) be provided demonstrating the impact on adjoining residential properties or public domain;
 - b) be based on a survey of the site and adjoining development;
 - c) be at 9.00 a.m., 12.00 noon and 3.00 p.m. at 21st June (private open space); and
 - d) be at 8.00 a.m., 12.00 noon and 4.00 p.m. at 21st June (north facing living areas).
- C5. Additionally, ensure height of such industrial development does not exceed (in metres) the height allowed for the adjoining use along the common boundary, subject to meeting the controls of overshadowing.
- C6. If the existing lot or open space already receives less than 4 hours of sunlight then the development shall not further reduce this solar access.

Pemulwuy Industrial

3.5. Building Heights and Design

Objectives

01. To ensure buildings do not adversely affect views from the M4, Great Western Highway and Prospect Reservoir environs to Prospect Hill.
02. To create building forms with appropriate scale and height, taking into consideration site topography.
03. To encourage a high architectural standard of contemporary design and innovation.
04. To provide for low rise, large scale buildings generally in horizontal form.
05. To achieve a good quality development which complements the streetscape.
06. To provide for low rise and large scale building to reduce visual impact to the surrounding area.
07. To ensure building heights do not adversely impact on the amenity of adjacent residential areas.
08. To ensure the scale and character of the development is compatible with other employment-generating development in the precinct concerned.
09. To ensure buildings are compatible with the height, scale, siting and character of existing residential buildings in the vicinity.
010. On development adjoining residential land, to store goods, plant, equipment and other material resulting from the development within a building, or to suitably screen them from view from residential buildings and associated land.

Development Controls

- C1. Ensure that the height and scale of buildings in the Northern Employment area are sensitive to views from the environs of Prospect Reservoir and the M4 Motorway. Generally 12 metres is the building height limit in the Northern Employment area. In the former CSIRO land, building heights shall not exceed 12.2 metres.
- C2. In the former CSIRO land, ensure compliance with Part D to protect adjacent residential amenity.
- C3. In the former CSIRO land, new buildings should not exceed the height of RL 63.0 metres (AHD).
- C4. In the former CSIRO land, the height level of buildings at the 15 metre setback line from the southern boundary, which abuts the residential lands, shall not exceed RL 61.5 metres (AHD). From this maximum height level, the height of buildings may increase away from the southern boundary setback to the highest level permitted for the site providing there are no increased overshadowing effects on the adjoining residential lands.
- C5. Ensure the architectural treatment of building facades is directed by energy efficiency and other environmental design considerations.
- C6. Articulate building facades to address all street frontages. Building facades can be articulated using architectural elements which include:

Pemulwuy Industrial

- variable roofs and skyline silhouettes (for example: saw toothed or pitched roofs and innovative skillion curved or 'floating' roof forms);
 - varying façade alignments;
 - 'breaking-up' facades with windows, changing wall alignments and the use of decorative features and structural features.
 - variation in materials, finishes and colours;
 - location, style and quantity of windows;
 - blade and fin walls;
 - cantilevered or overhanging elements;
 - verandahs, terraces, sun shading devices;
 - colonnades; or
 - variation in height.
- C7.** Architectural style is to contribute to the quality of the Estate, with emphasis on the horizontal lines and planes.
- C8.** Integrate roof top plant and services into building/roof forms or screened and compatible with the building design. Mobile phone towers are not permitted on tops of buildings unless integrated into the building/roof design.
- C9.** Articulate building entries so they are easily identifiable.
- C10.** Locate service areas including waste/recycling areas and external storage areas away from principal frontages and adequately screen them from view from any public road.
- C11.** Locate loading docks, roller shutters and other building openings that detract from the appearance of the building so they are not visible from the principal street frontage.
- C12.** Minimise cut and fill to protect existing drainage patterns and maintain integrity of the groundwater system.

Pemulwuy Industrial

3.6. External Materials and Colours

Objectives

- O1. To contribute to the visual quality of the Pemulwuy northern employment lands through selection of building materials and colours.

Development Controls

- C1. Use materials and colours for buildings and roofs that are subtle (no strong hues), recessive (mid-tone) and non-reflective.
- C2. Create varied facades through choice of external materials, including masonry, metal panels, CFC panels, metal sheeting for walls and roofs.
- C3. Express one predominant external material. The range of external materials on any individual building should be limited and compatible.
- C4. Ensure that dado panels or similar are a minimum height of 2 metres to all external walls. Construct dado panels of face brick, masonry, or other material that provides a high standard of finishes.
- C5. Pre-colour metal deck roofs in landscape tones.
- C6. Use only low maintenance and robust materials.
- C7. Minimise variations in colour. Accent colour is acceptable, e.g. for corporate logos and architectural details.
- C8. Ensure that external finishes are graffiti resistant.

Note: Indicate details of external materials and colours on the plans accompanying development applications.

3.7. Energy and Water Efficiency

Objectives

01. To encourage site planning and building design that optimises site conditions to achieve energy efficiency.
02. To design working environments that minimise energy and water use .
03. To encourage use of building materials that minimise impact on development.
04. To use passive and active design initiatives that respect the principles of ecological sustainable development.
05. To implement sustainable practices, e.g. water efficiency and conservation measures to reduce water consumption, and the use of solar energy for heating appliances.
06. To encourage Water Sensitive Urban Design Principles (WSUD) for the new development.
07. To encourage the use of rainwater tanks for outdoor use and toilet flushing in accordance with the requirements of Sydney Water;
08. To encourage the use of permeable paving, wherever possible, to increase water filtration into the ground.

Development Controls

- C1. Ensure all building development (including additions and alterations) complies with the requirements of the Building Code of Australia (BCA), and relevant reports accompany applications for construction.
- C2. In designing the orientation, internal layout and design of buildings, minimise energy consumption for heating and cooling. Aspects to consider include:
 - light penetration to internal areas;
 - natural ventilation;
 - passive solar design;
 - shading devices to minimise glare;
 - solar access to outdoor recreation areas.
- C3. Select building materials which, where feasible:
 - use renewable resources;
 - are energy efficient;
 - are low maintenance;
 - are recycled or recyclable;
 - are non polluting;
 - are non-ozone depleting; and
 - avoid where possible the use of PVC.
- C4. Install rainwater tanks to provide water for flushing toilets and other non-potable uses.
- C5. See Section 7.1 below under Stormwater Management for controls for water flow and quality

Pemulwuy Industrial

management during and particularly after development, and for Stormwater plans to minimise pollutant loads.

- C6.** Ensure compliance with Part A Water Sensitive Urban Design (WSUD).

Pemulwuy Industrial

3.8. Landscaping

Objectives

- O1. To encourage a high standard of landscaping to enhance the streetscape and amenity of the Pemulwuy north employment lands.
- O2. To accommodate outdoor staff areas.
- O3. To provide for retention of water for irrigation and drainage purposes.
- O4. On sites adjacent to the open space corridors, to select species to complement the plant species in the corridors.
- O5. To screen the interface to the adjacent residential uses.
- O6. To soften the impact of built form and car parking areas.

Development Controls

Note that “Landscaping” incorporates vegetation, gardens, outdoor staff recreation areas, natural site features and watercourses, but does not include that part of the site used for driveways, parking or outdoor storage.

- C1. Design the landscape of both hard and soft landscape features to create a quality industrial park setting. Hard landscape features include paving, terracing, retaining walls and kerbing. Soft landscape features refer to vegetation (including grass, shrubs and trees).
- C2. Within the landscape masterplan, identify existing waterbodies, creeks and creeklines on the site and provide for protection and rehabilitation of riparian zones within the site.
- C3. Design landscaping to visually unify and enhance the overall quality of the Pemulwuy north employment lands.
- C4. Provide outdoor amenity/recreation facilities for employees within the landscaped areas, to meet the likely needs of the workforce.
- C5. Protect existing significant trees and incorporate them into the design.
- C6. Provide landscaping as both hard and soft areas. However, provide and maintain approximately 15% of a site as soft landscaped area at ground level. The location of the landscaped areas will be determined at the development application stage having regard to meeting the criteria contained in this section. Landscaping design of both hard and soft landscape features should create a unified setting;
- C7. Where feasible, drain hard stand areas to soft landscaping areas to improve on-site infiltration of stormwater.
- C8. Provide non-slip finishes to paving.
- C9. Design landscaping to complement the buildings on site, the adjoining developments and streetscape, and to be compatible in scale.
- C10. Separate landscaped areas from vehicle areas with an effective physical barrier.
- C11. In the former CSIRO land, where a site adjoins a non- industrial use, provide a mature planting buffer and secondary acoustic fence within the industrial lot within the side and rear setbacks. Adequate acoustic buffers are required so that any impact is minimised.

Pemulwuy Industrial

- C12. Plant local indigenous species with mulched beds to help improve water quality and reduce water consumption.
- C13. Plant to highlight pedestrian and vehicular access points and building entries.
- C14. Landscape informally to promote parkland quality. Structured treatment may be used to enhance entries, etc.
- C15. Provide earth mounding in the landscaped setback along the north-south spine road. Embankments should be no steeper than 1:4 gradient in order to enable vegetation to be grown and maintained.
- C16. Landscape carparks to complement the surrounding landscaped areas, soften car parking areas and provide shade for parked cars. Plant a minimum of one tree for every four car parking spaces. Provide landscaping around the perimeter of carpark areas.
- C17. In open parking areas, plant 1 shade tree per 4 cars within or around the parking areas, except in the instance of central carpark divides (see Part D of this DCP).
- C18. Install automatic irrigation systems for all landscaped areas on the developed lots. Design them to meet specific site requirements. Consider minimising water consumption and preventing salinity in the design of landscaping and irrigation systems; prefer irrigation systems that monitor soil moisture conditions.
- C19. Install a drip irrigation system to all soft landscaped areas to reduce water use. Connect this system to rainwater storage tanks where possible.
- C20. Design landscaping to assist energy conservation in buildings and have regard to microclimatic conditions and shading control.
- C21. Design landscaping to encourage safety by ensuring street surveillance is possible, paths are not excessively screened and lighting is provided to pathways and building entries.
- C22. Design landscaping and setbacks to create an environment that encourages walking and the pedestrian use of public streets.
- C23. Submit a separate landscape masterplan with the first application received to subdivide land in each stage of the development. Requirements for subdivision include:
 - a) details of landscape concepts including thematic street planting, lighting and street furniture proposals to guide future development;
 - b) proposals for entry gateways in the north and south as appropriate;
 - c) identification of existing and proposed open space and vegetation corridors including riparian land, drainage corridors, stormwater detention ponds;
 - d) identification of existing natural features such as waterbodies and creeklines;
 - e) reference to and consistency with any relevant bushland management plan;
 - f) location and extent of pedestrian and cycleway networks; and;
 - g) demonstrate provisions for linkages of the above facilities to facilities on adjoining land.

Pemulwuy Industrial

3.9. Signage

Objectives

- O1. To encourage signage that contributes to the aesthetic integrity of the Pemulwuy north employment lands.
- O2. To ensure signage does not detract from the visual appearance of the buildings and locality.
- O3. To provide the opportunity for an approved use to adequately state the nature of the business conducted on the premises;
- O4. To regulate signage so that it contributes to the identity of the site;
- O5. To ensure signage does not compromise the safety of the M4 user;
- O6. To ensure illuminated signs do not unduly affect the amenity of the surrounding areas or interfere with driver's vision.

Development Controls

- C1. Relate advertising, other than real estate signs, to the use occurring on the respective property. i.e.: to serve only to identify the occupants of the premises.
- C2. Locate directional and tenancy signage in a convenient point close to the main entry to a development.
- C3. Locate signs below parapet level.
- C4. Moving, blinking or flashing signs are prohibited.
- C5. Incorporate signage into the architectural elements of the building of a size, shape and colour that does not detract from the architectural character of the building.
- C6. Where council has a fixed building line, advertisements will generally not be permitted between the building line and street alignment. Council will consider allowing business identification signs that serve only to identify the occupants of the premises, within the building line, provided they comply with the standards set out below. Council will also consider advertisements in the form of logos and trademarks, where they are incorporated into landscaping design.
- C7. Provide no more than one wall sign per occupancy, on the facade of the unit with which that occupancy is associated. The sizes and dimensions of such signage shall have regard to existing signage on other units, and dimensions of 2m x 1m are permitted without consent.
- C8. Where there is only one occupant for an entire building, provide no more than one wall sign per building facade.
- C9. Directory boards are to be comprised of not more than one (1) panel per unit. Each panel is:
 - a) to be uniform in size, colour and dimensions;
 - b) not to exceed 0.2 square metres per panel; and
 - c) to serve only to identify the number of the unit and the name of the respective occupant.
- C10. Locate the directory board on or behind the building line setback adjacent to the entrance to the site, unless with the prior consent of Council. Where the directory board is proposed

Pemulwuy Industrial

to be located within the building line setback incorporate it into the landscaping to Council's satisfaction.

- C11. Ensure that signage is easily readable.
- C12. Locate and display illuminated signs in a manner that does not cause glare, distract drivers or adversely impact on the amenity of nearby residences.



Figure 5- Example of Tenancy signage

Pemulwuy Industrial

3.10. Fencing

Objectives

- O1. To allow for security in the Pemulwuy north employment lands.
- O2. To ensure that the design of fencing contributes to the streetscape and amenity of the Pemulwuy north employment lands.
- O3. To provide for the amenity of adjacent residential land.

Development Controls

- C1. Avoid fencing between the building and the principal street frontage, where possible.
- C2. Where fencing is required for safety or security reasons to be forward of the building line, ensure that it is of a standard and style that does not detract from the landscaping and main building facades. Pre-painted solid metal fencing will generally not be acceptable. Provide details of fencing at the development application stage.
- C3. Locate fencing so it does not impede sight lines for drivers.
- C4. Ensure that fencing complements all landscaping to minimise visual impacts to the adjacent residential areas whilst providing site security.
- C5. Restrict fences fronting Clunies Ross Street to a height of 1 metre above natural ground level.
- C6. Within the Pemulwuy north employment lands, open form front fences to a height of 1.8 metres will be considered having regard to the presentation and design of the fence;
- C7. Utilise graffiti-resistant materials and finishes on fencing.

3.11. Exempt and Complying Development

For See Part 5 (General Commercial and Industrial Code) of the State Environmental Planning Policy (Exempt and Complying Development Codes) 2008. This SEPP controls certain Commercial and Industrial development with respect to:

- internal alteration to a building that is used as bulky goods premises, commercial premises, premises for light industry or a warehouse or distribution centre; or
- Change of use of [Commercial and Industrial] premises;
- Mechanical ventilation systems;
- Shop front and awning alterations;
- Skylights and roof windows.

Part 1 of the SEPP defines the general requirements for exempt and complying development for Commercial and Industrial purposes.

Part 2 controls general exemptions such as Access ramps, Bollards, Demolition, Minor building alterations, Privacy screens, Scaffolding, hoardings and temporary construction site fences, Replacement of identification signs, Temporary builders' structures, and Water features and ponds.

4. Transport

4.1. Principles for a Transport Plan

Guiding principles and performance targets for the establishment of a transportation system for Pemulwuy were based on SEPP 59 (State Environmental Planning Policy No. 59 – Central Western Sydney Economic and Employment Area). These principles have guided the precinct plans on which this DCP is based. With the transferral of much of the land to which this DCP applies to the State Environmental Planning Policy (Western Sydney Employment Area) 2009 (WSEA SEPP), the “existing precinct plans” (upon which this section of the DCP is based) continue to apply in determining a development application.

Note: see clause 26 (Development on or in vicinity of proposed transport infrastructure routes) of the WSEA SEPP.

Objectives

01. To address transport targets.
02. To establish guiding principles for design and layout of the site consistent with increasing the mode split towards public transport and non private vehicle usage and minimise vehicle kilometres travelled (VKTs).
03. To provide for all modes of transport, including roads, transit ways, walking and cycling facilities, which are integrated into the surrounding network of each mode.
04. To identify a range of transport infrastructure which addresses site requirements including the staging and funding proposals.
05. To identify links to the Transitway network outlined by 'Action for Transport 2010'.
06. To recognise freight and industry transport requirements including:
 - linkages from the site to the M4 Motorway; and
 - initiatives for integrating freight handling between industries.

Development Controls

- C1. Reduce the mode split of 'car as driver' for the journey to work by at least 10% (e.g. from 75% to 65%) compared to the existing surrounding area.
- C2. Reduce the total VKT (vehicle kilometres travelled) to be generated by the proposed development by at least 5% below that which would be generated by a 'conventional' approach to development”.

Pemulwuy Industrial

4.2. Regional Transport Requirements

Objectives

01. To provide regional transport infrastructure which will achieve the transport targets established in clause 4.1.
02. To develop regional transport infrastructure that will service the needs of the site and integrate into an improved regional transport network.
03. To provide infrastructure which recognises the need to integrate all modes of transport including public transport, private vehicle transport, walking and cycling.
04. To develop measures to mitigate potential adverse transport impacts generated by the development of Pemulwuy on surrounding areas.

Development Controls

- C1. Provide regional (and local) transport infrastructure improvements that are consistent with the Deeds of Agreement between the owners and the Roads and Maritime Services. Note: Holroyd City Council does not support the upgrade of the Great Western Highway/Beresford Road intersection contained within the RMS Deeds of Agreement. Seek alternative treatments to mitigate potential traffic impacts of the development of Pemulwuy.

4.3. Transport Design Guidelines - Land Use Location

Objectives

01. To generate efficient travel patterns across the site to reduce VKTs.
02. To maximise the use and support the viability of public transport services.
03. To avoid potential conflicts between various land uses.

Development Controls

- C1. Locate higher traffic generating land (office, retail) uses in close proximity (within 400 metres, walking distance) to public transport stops, nodes or interchanges on regional transport routes (such as the transitway) to reduce traffic generation and improve public transport usage and service viability.
- C2. Provide appropriate and conveniently located services such as shops and open space to reduce trip length and encourage use of pedestrian / cycleway networks.
- C3. Ensure that land uses are well integrated with public transport stops, nodes and interchanges so as to provide safe, attractive and inviting environments for public transport patrons.
- C4. Separate residential and employment precincts to avoid potential road function conflicts.
- C5. Favour co-locating similar or co-dependent employment developments within close proximity in order to generate potential synergies in transport and freight, so as to:
 - a) maximise simultaneous servicing by one vehicle thereby reducing the number of trips entering and leaving the site;

Pemulwuy Industrial

- b) improve trip containment levels within the site;
- c) manage travel demand. The location of co-dependent developments is primarily market driven. However, the marketing and sales promotion strategies employed can have a significant impact on the type of land uses attached to the development site and should be employed as a travel demand management tool.

4.4. Access and Circulation

Objectives

- 01. To ensure safe access movements to/from the Pemulwuy north employment area.
- 02. To provide access through the employment area to improve the regional road network.
- 03. To provide access to the employment area for employment land uses which minimise impacts on the surrounding local community.
- 04. To construct roads in such a way to accommodate the anticipated traffic volumes and in particular heavy vehicles. For example, to ensure that road access facilities are commensurate with the scale and extent of the proposed development and compatible with the surrounding traffic network.
- 05. To provide a 50 metre road reserve which allows for the future provision of a 25 metre wide transitway by the RMS.
- 06. To minimise potential conflict between street traffic and pedestrians caused by the vehicular movements to and from the site.
- 07. To minimise potential conflict between service vehicle (heavy vehicle) with smaller vehicle.

Development Controls

- C1. Ensure that intersections into the Pemulwuy north employment lands are designed with sound traffic planning principles and relevant guidelines including but not limited to:
 - a) Roads and Maritime Services's Road Design Guide;
 - b) Roads and Maritime Services's Guide to Traffic Generating Development (1993);
 - c) AUSTRROAD - Guide to Traffic Engineering Practice; and
 - d) while ensuring that walking and cycling are encouraged and not impeded.
- C2. Direct property access to north-south link will not be permitted other than in circumstances stated below.
- C3. The number of road access points to the north-south link is restricted, and at full development no direct property access from the north-south link will be permitted. Provide access from a limited number of service roads and separate the intersections by a minimum distance of 500 metres. Therefore there are only two service road intersections with the north-south link between the northern boundary and Butu Wargun Drive.
- C4. Direct property access from the north-south spine road, is only permitted as an interim arrangement during the staged construction of the development. Direct access to properties north of Butu Wargun Drive is permitted until the north-south spine road is constructed to the southern boundary of Pemulwuy north employment lands.

Pemulwuy Industrial

- C5. Provide the north-south link through the employment precinct so that direct and efficient access for freight and other heavy vehicles is provided to employment lots from the regional road network.
- C6. Ensure site access allows vehicles to enter and exit in a forward direction
- C7. Within the former CSIRO employment land, ensure vehicular access to and from the site is via Clunies Ross Street only, as illustrated in Figure 6. Direct vehicular access to the residential land is not permitted.
- C8. Within the former CSIRO employment land, provide a potential access point at the southern end of site boundary to Clunies Ross Street for emergency vehicles, as illustrated in Figure 6.
- C9. Within the former CSIRO employment land, ensure that emergency Access for fire appliances has a minimum width of 6m with 7m passing bays and internal radius of 6m for corners.
- C10. Within the former CSIRO employment land, ensure driveway width, configuration and location shall accord with 'Roads and Maritime Services' Guide to Traffic Generating Development (1993) and Australian Standard AS 2890.1: 2004.
- C11. Within the former CSIRO employment land, position access to Clunies Ross Street as far as practicable, to minimised impacts to adjoining residential development. Locate the driveway as far north as practicable having regard to sight lines along Clunies Ross Street.
- C12. Design internal circulation road and heavy vehicle manoeuvring areas to comply with the requirements of the following:
- AS2890.1-2004;
 - AS2890.2-2002; and
 - NSWB Guidelines for Emergency Vehicle Access.



Figure 6- Site access within the former CSIRO Employment land

4.5. Parking

Objectives

01. To encourage a reduction in the level of vehicular traffic by reducing parking requirements.
02. To ensure adequate parking for various land uses and sustain the market viability of the development.
03. To ensure that all car parking demands generated by any development are accommodated on the development site.
04. To design parking supply in accordance with the site's urban design principles. Thus, to:
 - a) ensure that the provision of off street car parking facilities does not detract from the visual character, particularly the streetscape of an area; and
 - b) ensure that the location of driveways, parking and servicing areas are efficient, safe and suitably landscaped.
05. To implement parking strategies which minimise adverse impacts on local communities and wider land uses. For example, to minimise conflict between service vehicles (heavy vehicles) and smaller vehicles within the site.

Development Controls

On-Street Parking

- C1. Note that the provisions of on-street parking for various road types within the road hierarchy are summarised below in Section 4.7, which indicates that on-street parking would be appropriate on some roads with the exception of the north-south spine road and the first 500 metres of the east-west link from Greystanes Road.
- C2. Design on-street parking to be consistent with the design principles and dimensional requirements of Australian Standards AS2890.5 and 1742.11.
- C3. In the provision of on-street parking, do not compromise street security and urban design / streetscape objectives.

Off-Street Parking Design

- C4. Design off-street parking to be consistent with the design principles and dimensional requirements of Australian Standards AS2890.1: 2004. Include in the design, compliance with driveway dimensions and location, sight distances, and dimensions for circulation aisles and grade / ramps.
- C5. Design off-street parking to ensure that vehicles are able to efficiently access parking spaces within minimal manoeuvring.
- C6. Suitably landscape off-street parking areas to minimise visual dominance.

Off-Street Parking Supply

- C7. Note that the parking requirements of developments within the Pemulwuy north employment lands are assessed on a site-by-site basis due to the varying parking demands of particular land uses.
- C8. Use Part D clause 3.8 (Parking and Vehicular Access) of this DCP as the appropriate guidelines

Pemulwuy Industrial

for the supply of off-street parking. However, consider these guidelines as maximum provisions rather than minimum provisions, as a means of encouraging public transport use (dependant upon provision of public transport).

- C9. Minimise off-street parking supply, having regard to:
- access to public transport (located within 400 metres);
 - likely employee usage of pedestrian and cycleway links to the employment precinct;
 - surveys of existing similar developments indicate a lower parking demand;
 - land use synergies with surrounding land uses;
 - the ability to manage the use of on street parking; and
 - complimentary/shared use of parking facilities.

4.6. Service Areas

Objectives

- To provide adequate access for heavy vehicles.
- To design road networks to minimise freight and heavy vehicle movements through the employment zones.
- To create separation between service areas (loading and unloading docks) and parking in order to avoid traffic congestion;
- To ensure that service areas are located and designed to facilitate convenient and safe usage.

Development Controls

- Position loading/unloading facilities so they:
 - do not interfere with visitor and employee parking spaces;
 - minimise any potential noise impacts; and
 - avoid delivery vehicles standing on any public roads, footways, laneways or service roads.
- Provide adequate on-site manoeuvring to enable all vehicles to enter and leave the site in a forward direction.
- Design access and circulation design within developments to comply with requirements specified by Australian Standards AS2890.2 2002. This will allow heavy vehicles to efficiently and safely access sites from the road network and internal facilities such as loading docks and courier type drop off zones.
- Design all roads to be wide enough to allow passage of regular service vehicles and emergency vehicles. These factors have been considered in the development of the road hierarchy described in the Section on Public Road Design.

4.7. Public Road Design

Objectives

01. To create a clearly defined road hierarchy based on use, function, amenity and geometric design requirements.
02. To maximise the efficiency of the Pemulwuy road network to reduce trip lengths and enhance the viability of public transport.
03. To allow efficient movement through Pemulwuy for regional traffic while discouraging such traffic into the employment or residential areas.
04. To provide convenient and efficient access for freight transport to the employment precinct.
05. To provide a safe road network for all modes using the roads including private and public transport, cyclists, pedestrians and mobility impaired persons.
06. To design streets that enhance the physical and visual connectivity of neighbourhoods.

Development Controls

Note: The north-south link, also known as the Spine Road and Transitway, together with the East-West Sub Arterial Distributor, also known as Butu Wargun Drive to the west of Prospect Hill, have been constructed to required dimensions. However, further road design principles are summarised below which addresses the functional needs of traffic, pedestrians and cyclists. These requirements do not necessarily apply to private roads.

- C1. Ensure that the internal road network layout should be permeable for direct pedestrian movements, but sufficiently constrained in order not to attract regional traffic into the employment or residential precincts.
- C2. Ensure that detailed design of the road network (i.e. intersection layout, pavement materials) is consistent with the traffic engineering principles of the RMS's Road Design Guidelines or the Austroad Guide to Traffic Engineering Practice.
- C3. Design roads so as to minimise the traffic noise impact on adjacent properties, particularly at approaches to residential areas.
- C4. Design roads and bridges so as to accommodate, wherever possible, the continuity of vegetation corridors and habitat to promote fauna movements.

The Spine Road:

- C5. Currently, one traffic lane is provided in each direction. In future. Consider providing a dual lane carriageway with two through traffic lanes in each direction.
- C6. The RMS to provide two bus only transitway lanes within the road reserve (one in each direction) plus median, shoulder and footpath/cycleways.
- C7. Ensure no parking in the road reserve.
- C8. Ensure no direct property access.
- C9. Provide a 1.2 - 1.75 metre width footpath located on both sides away from the kerb.
- C10. Provide a cycleway separated from the road pavement.

Pemulwuy Industrial

Butu Wargun Drive (west of Prospect Hill):

- C11. Ensure the potential to utilise clearway conditions during peak periods.
- C12. Ensure parking provision in carriageway during non clearway periods (or indented) providing two through traffic lanes in each direction at peak times and one through lane in each direction at other times.
- C13. Provide a 1.2 metre - 1.75 metre width footpath located on both sides away from the kerb.
- C14. Provide a designated cycle lane.

Access Streets

Note: Access streets contain an indicative traffic volume of less than 6,000 vehicles per day depending upon particular land uses. Cyclists are to share the road with vehicles.

- C15. Provide a 20 metre road reserve.
- C16. Provide an 8 metre carriageway where no on-street parking is permitted and heavy vehicle turning movements can be accommodated.
- C17. Provide access to all sites.
- C18. Provide a 1.2 - 1.5 metre width footpath located both sides away from the kerb.
- C19. Ensure that employment precinct road widths provide sufficient space to allow heavy vehicles to enter and exit lots safely in a single forward turning movement.
- C20. In cul-de-sacs, provide a 12-metre kerb radius turning area.

4.8. Public Transport

Objectives

- O1. To achieve a minimum 10 per cent increase in non-private vehicle mode splits for journey to work compared to a “conventional development” approach.
- O2. To provide a rapid bus transitway through the site which creates links between the site and the regional transport network.
- O3. To ensure that public transport stops, nodes and interchanges are safe, attractive and Development Controls

Development Controls

Rapid Bus Transitway

- C1. Provide public transport access points to maximise the proportion of employees who are located within 400 metres safe walk of a bus stop on a regular bus route.
- C2. Integrate Transitway Stations where possible with the surrounding land uses. In particular, the transitway stations should be located near the service centre, local activities, associated businesses and the public domain.
- C3. Align the transitway to follow the north-south Spine Road through the employment precinct.
- C4. Ensure the proposed transitway comprises:
 - a) two transitway lanes, one in each direction;
 - b) 2 stations;
 - c) stations that provide adequate accessibility, shelter, and commuter information to encourage usage. This will include facilities and linkages for pedestrians and cyclists.

Local Public Transport

- C5. Ensure that local bus feeder services from the residential and employment precincts are able to provide access to the site and future Transitway.
- C6. Provide link feeder services to surrounding local areas, i.e. Greystanes, to improve access, catchment size and hence service viability.
- C7. Provide appropriate facilities at bus stop locations to encourage increased use and safety. Such facilities would include bus lay-bys, speed controls to protect pedestrians, shelters and seating for waiting passengers, display of timetable information and street lighting for security.
- C8. Co-locate bus stops should with after-hour business or other activity wherever possible.
- C9. The alignment and geometry of roads that form bus routes need to allow for efficient and unimpeded movement of buses without facilitating high traffic speeds. Where potential traffic calming devices are installed along bus routes, specific design requirements for bus access must be employed.

Pemulwuy Industrial

- C10.** Implementation of 'Demand Management' by promoting alternative modes of travel to the private car. This would include distribution of information packs on bus services and cycle routes, free bus tickets and advertising of services.
- C11.** Indicative performance guidelines for bus routes are as follows:
- Minimum geometric layout:
- a) Radius: 12.5 metres;
- Road grades:
- a) Max. desired pavement crossfall: 3%;
 - b) Max. desired gradient: (within 50 metres of stations): 6%;
 - c) Absolute max. gradient: (within 50 metres of stations): 12%.
- (Source: RMS and AUSTRROADS)

4.9. Pedestrian and Cycle Routes

Objectives

- O1.** To encourage trips to be undertaken by walking and cycling instead of private vehicle.
- O2.** To promote connectivity throughout Pemulwuy.
- O3.** To create a clearly defined pedestrian and cycleway network within and through Pemulwuy.
- O4.** To make connections to regional cycle links and between major areas of proposed and existing open space and other recreational, community and employment land uses.
- O5.** To ensure non-vehicular links provide a safe and secure environment, both in terms of road safety and personal security, which encourages walking and cycling.

Development Controls

- C1.** Create pedestrian and cycle linkages between the residential precinct and areas of open space, recreational, community and employment land uses, broadly along the alignment shown on Figure 4 'Holroyd Bike Plan 2009'.
- C2.** Locate and design walking and cycling networks to:
 - a) provide direct routes between key trip origins and destinations;
 - b) minimise steep grades; and
 - c) be safe in terms of road safety and person security.

Pedestrian

- C3.** Undertake detailed design of pedestrian control and protection facilities in accordance with the relevant sections of the Australian Standards (AS1742) and council's Work Specifications for Subdivision and Development. This includes pedestrian crossings, signage, local area traffic management and disabled access.
- C4.** Ensure pedestrian-only footpaths have a minimum width of 1.2 metres (wider footpath may be required in areas of high pedestrian activity such as community facilities, shops and other activity centres) and a maximum grade of 15 per cent, except where grades on Prospect Hill make this unachievable.

Pemulwuy Industrial

Cycleways

- C5. Design cycling routes within the road hierarchy to reflect the level of activity and function of the various roads such as dedicated cycleways on collector roads and shared access on local streets;
- C6. Link designated cycleway routes to the surrounding regional cycleway network. Cycle routes along open spaces are to be between 2.5 – 3.0 metres in width (where shared with pedestrians), and designated accordingly.
- C7. Dedicated cycle lanes are to be either line marked or separated from the road lanes.
- C8. Provide opportunities for the cycle network to link with the proposed regional cycle route.
- C9. Use cycle routes to link all amenities and areas of interest, including commercial/retail areas, play areas and view points.
- C10. Ensure technical design requirements such as pavement design and intersection/crossing treatments are consistent with AUSTRROADS Guidelines (1998) Guide to Traffic Engineering Practice, Part 14, Bicycles;
- C11. Distribute secure bike parking throughout the cycleway network and likely destination points. Parking facilities range from simple hitching rails to secure bike lockers. Key locations would be within the employment precinct, near public transport linkages, and at the village centre.
- C12. Provide for cycle refuge facilities at cycleway access points with collector roads.

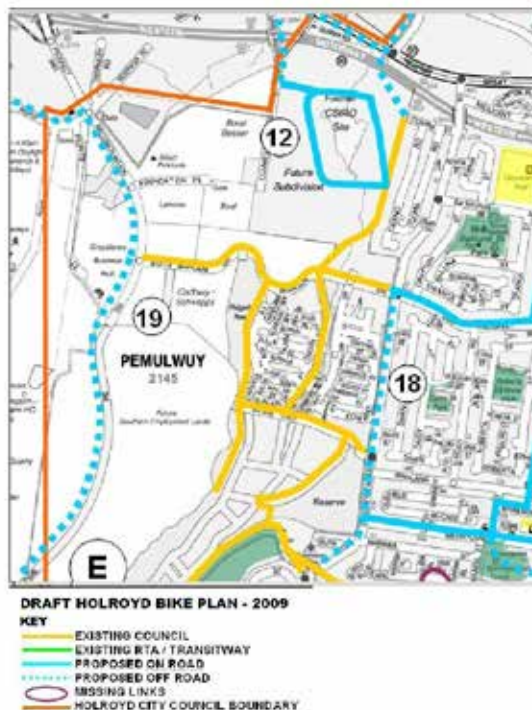


Figure 7- Holroyd Bike Plan 2009

5. Heritage

5.1. Guiding Principles

Clause 8 of Schedule 4 of the State Environmental Planning Policy (Western Sydney Employment Area) 2009 states that:

In making provision for or with respect to heritage conservation, a development control plan must address:

- (a) the impact of proposed development on indigenous and non-indigenous heritage values, and
- (b) opportunities to offset impacts on areas of heritage significance.

In terms of Archaeological and European Heritage, SEPP 59, upon which this DCP is based, requires that any precinct plan or DCP is to abide by the following relevant guiding principles:

01. To have regard to the conservation of items of heritage significance identified in the SEPP 59 or any other environmental planning instruments or subject to an order under the Heritage Act 1977;
02. To have regard to development should be planned to minimise impacts on areas of high biodiversity or Aboriginal heritage significance and should seek to enhance the values of these areas.

5.2. Archaeology

Objectives

01. To protect site locations.
02. To reflect Aboriginal occupation and history in the public areas.

Potential Archaeological Deposits:

Within the Employment Lands of Pemulwuy, two areas originally identified as having Potential Archaeological Deposits (PAD), were located in the northern section and south western corner of the Pemulwuy employment lands. Further investigations by Navin Officer (2001) concluded that there were no areas of PAD on the site, and that no further mitigation measures were required on the previously nominated PADs. Nevertheless:

Development Controls

- C1. Take care when disturbing this area, and if archaeological material is observed during or after clearing, work should cease immediately and the Aboriginal community consulted and advice sought from NPWS.
- C2. Do not make site locations and descriptions publicly available.
- C3. Provide to developers and general maintenance staff only general knowledge of Aboriginal sites and their legal protection.
- C4. Prepare an education strategy for cultural heritage awareness for developers, contractors and Consent authority staff, including a fact sheet and sensitivity map indicating areas requiring particular attention and consultation with the Aboriginal community and NPWS.
- C5. Invite the Aboriginal community to actively participate in developing the education strategy.
- C6. Consult the Aboriginal community prior to and during clearing and preliminary ground work to collect artefacts if any, from areas to be developed.

Pemulwuy Industrial

- C7. Do not erect signs which draw attention to the archaeological sites, so as to prevent disturbance and defacement of Aboriginal/archaeological sites.
- C8. In naming parklands, reserves and roadways, incorporate recognition of Aboriginal occupation and the history of the area. Consult the Aboriginal community in the naming of these features.
- C9. Consult the Aboriginal community on the development of any walking routes or areas within the precinct which incorporate descriptive signs and interpretation.
- C10. Develop a program to educate the local community in the pre-European history of the site.
- C11. Recreate and manage the cultural landscape in conjunction with the local Aboriginal community by vegetating open space to resemble the natural landscape prior to European settlement.

Note: The former CSIRO employment land is highly disturbed. It has been mostly cleared and subject to many years of use for research laboratories and associated stock holding areas associated with a CSIRO sheep research laboratory. Previous disturbance is associated with WW II occupation by a U.S. Army Camp. Consequently, there are no Aboriginal Archaeological management measures applicable to the former CSIRO employment land.

5.3. European Cultural Heritage

For more information, see the Prospect Hill Conservation Management Plan.

Objectives

- O1. To protect the integrity of the crown of Prospect Hill.
- O2. To research and document the history of the site of Pemulwuy and its role in the history of Sydney.
- O3. To educate the community on the history and role of the site.
- O4. To utilise the history of the site as a theme in its redevelopment.
- O5. To protect Prospect Hill from development sited below RL 97, which approximately defines the curtilage of the Prospect Hill State Heritage Registered Area.

Development Controls

- C1. See Section 5.4 for controls for the Prospect Hill State Heritage Registered Area.
- C2. Record Pemulwuy as a whole in its current state photographically, utilising aerial photography and possibly digital video recording.
- C3. All documentary, cartographic and photographic material related to the development, growth, buildings and history of the site should be sourced, accessioned and archived. Collect copies of accessible historic material into an archive which must be lodged in the care of an organisation which is acceptable to Council and where it is available for research and educational purposes. Identify archive material held elsewhere and cross-reference it with the above archive. A written description of major structures should accompany the photographic record.
- C4. Ensure that all development adjacent to the Prospect Hill State Heritage Registered Area is accompanied by a Heritage Assessment with all Development Applications. The Heritage Assessment shall be in accordance with the three documents listed below under 5.4 C2.

Pemulwuy Industrial

- C5. In the instance where a broad Heritage Assessment of the interface between the Prospect Hill State Heritage Registered Area and the adjoining sites has been undertaken, submit a Statement of Environmental Effects addressing this Heritage Assessment with all Development Applications.

5.4. Prospect Hill State Heritage Registered Area

Objectives

- O1. To protect the integrity of the Prospect Hill State Heritage Registered Area.
- O2. To research and document the history of the Prospect Hill State Heritage Registered Area and its role in the history of Sydney.
- O3. To educate the community on the history and role of the site.
- O4. To utilise the history of the site as a theme in its redevelopment.

Development Controls

- C1. Maintain the prominence of Prospect Hill as a significant remnant geologic and topographic element. Site and design development so that views of the ridgeline are maintained.
- C2. Maintain the views from Prospect Hill towards the Blue Mountains and St. Bartholomews, Prospect.
- C3. Ensure that future use, landscape interventions, heritage interpretation and vegetation management of the Prospect Hill SHRA are informed by and consistent with:
 - a) The Prospect Hill Conservation Management Plan (Conybeare Morrison: 2005);
 - b) The Prospect Hill Heritage Landscape Study and Plan (Government Architect's Office: 2008); and
 - c) The Prospect Hill Heritage Interpretation Plan (MUSEcape: 2009).
- C4. Ensure that all development adjacent to the Prospect Hill State Heritage Register Area is accompanied by a Heritage Assessment with all Development Applications. The Heritage Assessment shall be in accordance with the three documents listed above under C2.
- C5. In the instance where a broad Heritage Assessment of the interface between the Prospect Hill State Heritage Register Area and the adjoining sites has been undertaken, submit a Statement of Environmental Effects addressing this Heritage Assessment with all Development Applications.
- C6. Prepare management plans for open space and other public domain areas, and identify how they will inform and educate the community and utilise the history of the site as a theme of the redevelopment, using interpretative trails, signage, environmental design and other features.

6. Biodiversity

Ecological objectives for the northern employment lands take into account the provisions of SEPP 59, upon which this DCP is based, National Parks and Wildlife Act 1974, the Threatened Species Conservation Act 1995, Environment Protection and Biodiversity Act, recommendations of the Urban Bushland Biodiversity Survey - Stage 1: Western Sydney (NPWS, 11 99 111), Rivers and Foreshores Improvement Act 1948 and Fisheries Management Act 1994.

6.5. Biodiversity in Development Areas

Objectives

01. To maintain and enhance the existing level of biodiversity during and after development.
02. To incorporate ecological and archaeological resources into the creation of public open space .
03. To rehabilitate and regenerate native vegetation.
04. To protect significant trees.
05. To reintroduce local indigenous species where feasible, especially in drainage areas, open spaces and landscaped areas.
06. To create fauna movement corridors within the site and to external ecological resources (where practicable allowing for other site uses).
07. To reduce water and fertiliser demand.
08. To protect threatened species.
09. To manage weeds.
010. To plant and manage the site to minimise hazards and manage impacts from bushfire.
011. To manage litter and waste to minimise impacts.
012. To control and minimise impacts from sediment disturbance and erosion.
013. To manage feral and domestic animals to minimise impacts on native flora and fauna.
014. To protect water quality and aquatic habitat.
015. To involve the community.

Development Controls

Local species

- C1. Undertake a tree survey to identify and flag all significant trees on the site to be retained.
- C2. Prepare a bushland management plan prior to development which identifies areas to be revegetated, the species to be used and other detailed conservation area management issues.
- C3. Ensure tree removal is approved under Holroyd City Council's Local Environmental Plan 2013.
- C4. Ensure tree removal is subject to Arborist Assessment and recommendation.
- C5. Use locally indigenous plant species, including threatened and regionally significant species in drainage areas, streetscapes, open spaces and landscaped areas. This will not only enhance biodiversity but will reduce water and fertiliser demand.

Pemulwuy Industrial

- C6. Select plant species used in the development of the site from the 'Indigenous Plant List - Holroyd' from Table D2.1 of the BASIX Specifications .
- C7. Retain existing canopy species typical of Grey Box Woodland unless significant harm is likely to result.
- C8. Where possible, retain significant mature trees with high ecological value as habitat for the Grey Headed Flying Fox (e.g. Melaleuca swamps, Banksia woodlands, mangroves and riparian woodlands).
- C9. Avoid lopping or removing Grey Box Woodland canopy species greater than three metres tall.
- C10. Collect and propagate seeds of locally indigenous species prior to development. Use these, hardened on site, in revegetating the open space corridors.
- C11. Prohibit species other than locally indigenous species in the central ridgeline corridor and strongly discourage them in the service / open space corridors.
- C12. Retain and enhance continuous canopy in the open space corridors to allow for possible squirrel glider movement onto the site.
- C13. Retain and maintain hollow-bearing trees on site for their fauna habitat value wherever possible.
- C14. Incorporate in the design of sites sufficient space to allow for tree establishment, where proposed. This includes the provision for the development of deep structural roots.
- C15. Investigate the use of native grasses in service / open space corridors rather than kikuyu, couch or other conventional non-native grasses.

Weeds

- C16. A priority listing of target and noxious weeds should be outlined in the bushland management plan, including lantana, African olive, small-leaved privet and large-leaved privet.
- C17. The bushland management plan should address weed management and removal methods such as hand weeding, spraying etc. The plan should give attention to the corridor areas.
- C18. Remove all weeds, including any non indigenous native species.
- C19. Weed control should be an integral part of maintaining and enhancing biodiversity of the corridors.
- C20. Involve the community in weed removal and replanting programs; continue to involve community in maintenance to instil a sense of ownership.
- C21. Replant cleared areas with locally indigenous plants following weed removal, to minimise soil erosion.

Waste Management

- C22. Provide adequate signs and rubbish bins to encourage proper disposal of litter.
- C23. Secure rubbish bins sufficiently to prevent feral cats, dogs, rats or other undesirable species from opening them.
- C24. Maintain and empty bins on a regular basis to prevent waste accumulating.
- C25. Incorporate litter and waste management in the community consultation strategy.

Pemulwuy Industrial

Creeklines (see also clause 6.2 Fauna Movement Corridors, below)

- C26.** Rehabilitate, enhance and re-establish on-site waterways including creeklines and drainage lines.
- C27.** Identify locations within the corridor network, in addition to the central ridgeline, where understorey regeneration can be promoted. Plantings should allow for a continuous canopy along the length to facilitate movement of non ground-dwelling fauna.
- C28.** Only plant locally indigenous species in vegetating the corridor network including threatened and regionally significant species.
- C29.** Commence planting and/or install fencing as soon as possible following weed removal, to minimise erosion.
- C30.** Provide an appropriate buffer either side of creeklines. Rehabilitate vegetation within the buffer and remove weeds.
- C31.** Install appropriate pollution controls such as gross pollutant traps in upper catchments (at site boundary if necessary) to prevent ingress of litter.
- C32.** Prepare a sediment and erosion control plan with particular emphasis on the open space corridors and creekline.

Sediment and erosion controls

- C33.** Ensure appropriate sediment and erosion controls are implemented on site.
- C34.** Prepare a sediment and erosion control plan for each stage of the development, as per DCP Part A clause 13.0 (Erosion and Sediment Control).

Feral and domestic animals

- C35.** Prepare a feral and domestic animal management plan incorporating strategies outlined in the Background Report.
- C36.** Implement an education program on responsible pet ownership.

Fire

- C37.** Prepare a Fire Management Plan for the protection of life and property within Pemulwuy north employment lands. The Fire Management Plan should identify suitable fire regimes for the protection and maintenance of biodiversity.
- C38.** Ensure that fire management elements are incorporated into the design of the central ridgeline i.e. fire trails.
- C39.** Identify appropriate fire management regimes for vegetation management.
- C40.** Provide external hydrants for bushfire operations.
- C41.** Plant fire retardant species within the landscape areas.
- C42.** On the former CSIRO lands, provide roads of 6 metres in width for fire appliances access with passing bays for opposing vehicles;

Community involvement

- C43.** Ensure that Aboriginal community are involved in reserve and corridor design, revegetation and interpretation programs.

Pemulwuy Industrial

- C44. Develop an educational program highlighting the significance of the site and how the community can be involved in restoring and maintaining the conservation area and open space corridors.
- C45. Prepare a community consultation strategy to involve the community in ongoing biodiversity management including preparation of the bushland management plan.
- C46. Involve the community, including local school groups in Streamwatch programs.

6.6. Fauna Movement Corridors

Note: The main fauna corridor within Pemulwuy is proposed within the residential area. It is a predominantly vegetated corridor with some passive recreational and aesthetic functions. This corridor should be located along the central ridgeline separating the employment lands from residential development. See also C26 to C32 above on Creeklines.

Objectives

- O1. To extend the ridgeline fauna movement corridor westward to provide additional opportunities to link to Greybox Reserve and Prospect Reservoir.

Development Controls

- C1. Plant vegetation in riparian corridors, to facilitate fauna movement through the other open space corridors and street trees.
- C2. Provide vegetation which will facilitate movement through the site of non ground dwelling fauna as well as providing additional foraging habitat.
- C3. Within development applications, provide details which demonstrate how connectivity with off-site ecological linkages can be achieved.

7. Environmental Management

7.1. Stormwater Management during construction

The Pemulwuy employment lands can be divided into two main catchments. These are:

- the Pemulwuy north employment lands, approximately 82 hectares, that drain to the Greystanes Creek; and
- the Pemulwuy south employment lands, approximately 134 hectares that drain to Prospect Creek.

Development of the Pemulwuy employment lands without proper mitigation measures will increase the flow volumes and pollutant loads discharged to these creeks. Greystanes Creek is a tributary of the Toongabbie Creek and is located in the upper Parramatta River catchment. A Stormwater Management Plan was prepared for this catchment by the four catchment councils and the Upper Parramatta River Catchment Trust. See Appendix A.

A riparian corridor in the north of the Pemulwuy north employment lands is constructed, capable of conveying the 1%AEP flood flows. Water flows in a naturalistic creek channel, providing aquatic habitat and riparian vegetation as well as cycle and pedestrian pathways. It links to the constructed wetland basin in the north eastern part of the Lands to maintain suitable water quality as well as providing further aquatic habitat. Where possible, make maximum use of regional detention basins or water quality control ponds just downstream of the Lands.

Objectives

01. To prevent sediment polluting creeks during construction of the development.

Development Controls

- C1. Prior to construction a sediment and erosion control strategy will be developed in accordance with the "Blue Book" 2004 and Holroyd City Council Requirements . See DCP Part A clause 13.0 (Erosion and Sediment Control) for Council's requirements.
- C2. Sediment and Erosion control plans are required for new developments to prevent pollution of the creeks during the construction phase of the development. The plans are required to be prepared in accordance with the Managing Urban Stormwater guidelines including the Managing Urban Stormwater: Soils and Construction published by the Department of Housing.
- C3. Stage development activities to minimise land disturbance.
- C4. Limit earthworks and disturbance of stable rehabilitated landforms.
- C5. Divert clean run-off from upstream areas around disturbed areas.
- C6. Stabilise and vegetate areas immediately following the completion of works.
- C7. Provide temporary sediment basins, fences, catch drains, check dams and other structures to collect and treat run-off from disturbed areas.
- C8. Monitor discharges from sediment basins and flocculation as required to limit TSS concentrations in water discharged from the basins to 50 mg/L.
- C9. Provide vegetated buffer strips around all water bodies and drainage channels.
- C10. Temporarily stabilise stockpiles and disturbed areas exposed for more than 15 days.
- C11. Restrict vehicle access to designated entry and exits.

7.2. Stormwater Management After development

Objectives

01. Provide a development consistent with the principles of total watercycle management but recognising potential salinity problems.
02. Limit stream velocities to prevent erosion and scour of local waterways.
03. Reduce pollutant loadings to maintain downstream water quality.
04. Prevent the contamination of surface water or groundwater by stormwater run-off.
05. Ensure reduced demand for imported mains water by water conservation measures and re-use of stormwater in accordance with the principles of Water Sensitive Urban Design .
06. Protect the downstream aquatic ecosystems and riparian vegetation of any creek corridors.
07. Ensure that additional stormwater runoff generated by the development does not adversely affect peak flows, velocities and water levels downstream of the site in the full range of flood up to 1 in 100 year storm event.
08. Meet catchment wide water quality objectives of EPA's Interim Environmental Objectives and Sydney Harbour and Parramatta River Catchment.
09. Ensure that additional stormwater runoff generated by the development does not adversely affect peak flows, velocities and water levels downstream of the site in the full range of floods.

Development Controls

- C1. The treatment objectives for the Upper Parramatta River catchments are listed below in Table I. The objectives outlined in this table are consistent with Council's Stormwater Management Plans.
- C2. Ensure stormwater management systems are incorporated in the initial stages of design and infrastructure provided prior to the development of individual sites.
- C3. Design on-site stormwater management measures to the water quality objectives of:
 - a) the Stormwater Management Plan,
 - b) the flow requirements of the UPRCT, and
 - c) Holroyd City Council.
- C4. Where feasible, incorporate in the proposed stormwater management measures, natural treatment mechanisms and features.
- C5. Integrate public open space with the trunk stormwater drainage corridors.
- C6. Where practical, reuse stormwater collected on developed lots. This can include rainwater tanks. This should be encouraged to minimise pollutant exports and reduce the hydrologic impacts associated with the development.
- C7. Carry out further stormwater management consultation with authorities during the development application stage.
- C8. As part of the development process, undertake detailed hydrologic, hydraulic and water quality modelling .

Pemulwuy Industrial

- C9.** Design stormwater systems including on-site storage so that there are no linkages between surface and groundwaters to minimise the risk of contamination of surface waters by potentially saline groundwaters.
- C10.** Use the results of the monitoring program required by the Soil Erosion section of this plan to inform surface water management practices as required.

Table 1 POLLUTANT RETENTION CRITERIA FOR GREYSTANES CREEK CATCHMENT

Pollutant	Description	Retention Criteria
Litter	All anthropogenic material	70% of objects 5 mm diameter or greater
Coarse Sediment	Coarse sand	80% of the load for particles 0.5 mm or less
Nutrients	Total phosphorus and Total Nitrogen	45% retention of the load
Fine Particulates	Fine sand	50% of the load for particles 0.1 mm dia. Or less
Cooking Oil & Grease	Free Floating Oils that do not emulsify in aqueous solutions	90% of the load with no visible discharges
Hydrocarbons	Anthropogenic hydrocarbons that can be emulsified	90% of the load

Source: Upper Parramatta River Catchment Stormwater Management Plan

- C11.** Design and maintain development so that downstream flows are not adversely affected, based on comparison of peak flows, velocities and water levels in the 2 year ARI, 100 year ARI and probable maximum floods at critical points further downstream
- C12.** Arrangements for the expansion of the regional detention basin (200m to the north of the Pemulwuy north employment lands in Blacktown City Council LGA) must be confirmed and proposals identified as part of any application for the subdivision of land in the Pemulwuy north employment lands.
- C13.** Should it prove impractical or impossible, for whatever reason, to modify the detention basin to meet the above-stated objective that downstream off-site flows are not adversely affected, a flood retarding basin should be provided within the Pemulwuy north employment lands to satisfy that objective.
- C14.** During any development and construction, remove at regular intervals any sediment from the Pemulwuy north employment lands deposited off site in the flood basin of the Pemulwuy north employment lands or the downstream creek channel, and again prior to completion of construction.
- C15.** On the former CSIRO lands:
- provide on-site Stormwater Detention for the entire site;
 - provide an above ground detention basin that accords with Upper Parramatta River Catchment Trusts requirements;
 - install end of line proprietary water quality devices which are capable of removing gross pollutants and fine sediment, at suitable locations before discharging into the basin; and
 - utilise the aboveground detention basin to facilitate further settling of suspended solids and the removal of nutrients.

Pemulwuy Industrial



Figure 8: The constructed wetlands- Pemulwuy North Employment Lands

- e) The recommended wetland ponding size for the Greystanes Creek catchment is 1.4 hectares surface area.

7.3. Stormwater plans

Objectives

01. To employ source controls to minimise the pollutant loads discharged from individual development sites.
02. Apply conveyance controls to the local and trunk drainage systems to minimise the pollutant load transferred from the development sites to the discharge points.
03. Use Discharge controls immediately prior to discharge from the employment land to Greystanes Creek. This will ensure that water quality of the downstream creek is protected.

Development

- C1. Prepare Stormwater Plans to accompany development applications for individual lots in the Employment Lands.
- C2. Ensure these Plans are consistent with Stormwater Management Plans prepared by councils by direction from the EPA.
- C3. Adopt a treatment for the individual lots which addresses source controls issues.
- C4. Incorporate Convergence and Discharge Controls in the design of the drainage infrastructure for the site. In summary the controls are:
 - a) Source Controls = controls applied to the individual lots to address specific pollutants

Pemulwuy Industrial

associated with the specific development;

- b) Conveyance Controls = controls applied to the local and trunk drainage systems these may include grass swales, and streams incorporating ponds, riffle zones and macrophytes; and
- c) Discharge Controls = controls prior to discharge from the Pemulwuy north employment lands prior to run-off flowing into Greystanes Creek. These include gross pollutant traps, wetlands and water quality control ponds.

Source Controls

- C5. Pollution Prevention – Minimise the amount of impervious areas on the development lot, bund and roof all chemical and fuel storage areas, roof vehicle servicing and refuelling facilities, separate run-off from ‘clean’ and ‘dirty’ areas of the lot.
- C6. Stormwater Harvesting = Maximise the amount of stormwater run-off used on the development lot. Investigate the feasibility of re-using stormwater runoff for dust suppression systems, vehicle washing and wheel washes, and irrigation of landscaped areas of the lot.
- C7. Oil/Water and Oil/Grit Separators = Use oil/water and oil/grit separators and first flush basins to treat run-off from ‘dirty’ areas of the development lot. Design these systems to meet the pollution retention criteria for hydrocarbons and coarse sediment in Table I.
- C8. Buffer Strips = landscape approximately 15% of the area of the lots. Where the development lot layouts allow, use the landscaping to treat run-off from the primary treatment devices. Plant vegetated buffer strips to reduce the amount of fine sediment and nutrients discharged from the lot to the wetlands and water quality control ponds.

Conveyance controls

- C9. Grass Swales = Use open grass swales in the detailed design of the subdivision in preference to conventional kerb and gutter and pipe drainage. Swales reduce flow velocities limiting erosion of the stream banks. The lower velocities and filtration through vegetation reduces fine sediments, nutrients, hydrocarbons and heavy metals discharged to the treatment ponds.
- C10. Watercourse Profiles = one watercourse is provided through the Estate to collect stormwater run-off, draining to the northern water quality control ponds. Where feasible the watercourse, should include a meandering low flow invert, ponds and riffle zones, and aquatic and riparian vegetation.

Discharge controls

- C11. Provide gross pollutant traps, incorporating a screen and coarse sediment sump, upstream of the ponds and wetlands. Design these to achieve the pollutant reduction targets set out in Table I for coarse sediment and litter.
- C12. Provide Constructed Wetlands and Water Quality Control Ponds for tertiary treatment of stormwater before it is discharged from the Pemulwuy north employment land to Greystanes Creek. The wetlands and ponds have been sized to meet the treatment objectives for sediments and nutrient outlined in the stormwater management plans. The ponds and wetlands should be located off-line with a bypass channel used to divert flows during large storms around the ponds. The ponds, where feasible, should consist of a series of shallow densely planted zones and deep water areas.

7.4. Water Quality Control Pond Management

Note: A Constructed Wetland and Water Quality Control Pond is located in the northern sector of the Pemulwuy north employment lands. The riparian zone is established in the western portion of the same lands, and also carries overland flow originating in the Prospect Reservoir area, to the water quality control pond (see Figure 9). The flood basin does not apply to the former CSIRO lands.

Objectives

- O1. To provide dry weather flows and minimise changes in the hydrologic regime of Greystanes Creek.
- O2. To provide a safe, efficient urban water management system which also contributes to the amenity, appearance and urban structure of the Pemulwuy north employment lands.
- O3. To achieve multiple use of drainage systems.

Development Controls

- C1. In addition to the Water Quality Control Pond (a constructed wetland) on site, the Pemulwuy north employment lands may also use regional detention basin immediately north of the Lands.
- C2. Prepare an Operational Plan for the pond. This should set out how flow releases in the main water body are managed to improve baseflows in the downstream creek, Which suffers from decreased base flows due to urbanisation of the catchment.
- C3. Note that hard edges may be required to prevent creation of mosquito habitat.
- C4. Design the outlet into the pond to allow water levels to be varied for aquatic plant management.
- C5. Regularly maintain the gross pollutant traps and coarse sediment sumps to prevent a build-up of sediment in the main water bodies.
- C6. Develop an operational manual for the wetland pond that outlines the requirements for inspections and maintenance.
- C7. Integrate the landscaping with the design of the waterbodies to improve the amenity of the area.
- C8. Maximise use of regional facilities to achieve the run off flow rate and water quality controls.
- C9. As an industrial catchment with native landscaping, there will generally be insufficient nutrients to promote excessive aquatic weed growth. However, should any aquatic weed management measures be required, implement the following methods:
 - a) changes in basin water levels;
 - b) harvesting of the aquatic weed; or
 - c) application of herbicides approved for aquatic weed management by the EPA.
- C10. Seek to attain a 1.4 hectare area for the wetland pond

Pemulwuy Industrial



Figure 9: The constructed wetland and riparian corridor Pemulwuy North Employment lands

7.5. Flood Risk Management

Development Controls

- C1. Design any proposed structure with a floor level (habitable, office, storage, and/or shop) a minimum of 500mm above the 1% AEP flood level .
- C2. In the Pemulwuy North Employment Lands, the riparian channel cross-section has been designed so that the Probable Maximum Flood levels (called Flood Prone Land) will be contained within the 40 metre riparian corridor. Development is prohibited within this corridor.
- C3. Design road systems to provide a flood-free evacuation route.
- C4. On the former CSIRO lands, site all new buildings outside the Imminent Flood Failure (IFF) zone, and provide them with adequate free board to the IFF levels.

Pemulwuy Industrial

7.6. Site Contamination and Remediation

The Pemulwuy Employment Lands largely comprise land that has been quarried as part of Prospect Quarry. Historical and present land uses include:

- quarrying and overburden stockpiles;
- recycling of construction materials;
- quarry maintenance buildings; and
- pine plantation and naturally vegetated areas.

State Environmental Planning Policy 55 requires Council to consider contamination issues in determining development and subdivision applications. Given the limited range of past and present land uses, the possibility of site contamination is considered to be low.

However, to ensure that land is free from contamination, a Stage I Preliminary Environmental Audit was required to be submitted with the first development application received for the Pemulwuy north employment lands. A Site Audit Statement was also provided to address the former CSIRO site.

Objectives

- O1.** To ensure the appropriate assessment, remediation, validation and auditing of potentially contaminated land to reduce the risk of harm to human health or the environment.
- O2.** To ensure land is suitable for the intended use.
- O3.** To ensure that future occupants or workers at the site are not exposed to contaminated materials.
- O4.** To undertake investigations and remediation consistent with Holroyd DCP Part A - Appendix K – Contaminated Land Policy.

Development Controls

- C1.** Initiate an unexpected findings protocol to address the potential discovery of contaminated soil or other hazardous materials during bulk earthworks activities.
- C2.** As a result of the protocol, ensure that appropriate Stage 2 assessment, and (where necessary) remediation and validation occurs.
- C3.** Make provision in the protocol to inform Council of the discovery of such materials.
- C4.** Before the lodgement of any development application for the site, complete a groundwater Assessment in accordance with 'Schedule B(6) Guidelines for Risk Based Assessment of Groundwater Contamination' in the National Environmental Protection Councils National Environment Protection (Assessment of site Contamination) Measure (1999).
- C5.** Remediation is required to render the site suitable for the proposed land use, consistent with the above Stage I Environmental Audit.
- C6.** Ensure the remediation of the site is certified by a NSW EPA Accredited Site Auditor.

Pemulwuy Industrial

7.7. Earthworks Procedures

Objectives

- O1. To ensure that any fill utilised throughout the site is clean and complies with relevant standards.

Development Controls

- C1. Evaluate each portion of the Pemulwuy north employment lands as required by the Phase I Investigation provided by an environmental consultant for:
 - a) Existing soil condition down to bedrock;
 - b) Groundwater monitoring;
 - c) Validation of both fill zone foundation and proposed fill material to provide material within acceptable EPA criteria for re-use.
- C2. Provide approval of the above by a NSW DEEC&W Accredited Site Auditor to allow placement of fill and the excavation and re-use of on-site material to provide a revised landform.
- C3. Upon the validation and approval of fill foundation and fill material, place and compact material generally in accordance with:
 - a) all material <300 mm in size;
 - b) compaction up to 98% standard compaction to building and road lots;
 - c) moisture content 60-90% of optimum;
 - d) compaction to 95% standard in landscaped areas. Rip landscaped areas to a depth of 300/450 mm and mix in organic material to improve soil quality as required.
- C4. Final verification of placement of clean fill material will be undertaken through the process of design/construction Quality Assurance Audits.

7.8. Salinity

A site investigation, entitled Greystanes Estate Salinity Assessment, carried out by ERM in June 2001, undertook limited field testing of the DLWC Draft Salinity Hazard Mapping for Western Sydney, and found areas of known salinity and extensive salinity hazard within the Pemulwuy north employment lands, associated with the riparian corridors in particular.

Objectives

- O1. To minimise disturbance to natural hydrological systems as a result of development.
- O2. To ensure the proper management of land affected by salinity.
- O3. To prevent damage to buildings and infrastructure caused by salinity.
- O4. To manage and mitigate impacts from salinity

Development Controls

Monitoring

- C1. Undertake monitoring of groundwater levels to provide additional information on which to base future design.
- C2. Establish monitoring wells in two cross-sections in the creek located adjacent to the northern boundary of the Pemulwuy North Employment Lands.
- C3. The monitoring program should consist of monthly sampling for a minimum period of 5 years or until development is commenced on all lots within the Northern Employment Lands, in addition to sampling after rainfall events greater than 20 millimetres in 24 hours.
- C4. These results should be consolidated into a single report at the end of each 12 month period.
- C5. For development proposed in the areas known as at risk of salinity and extensive salinity hazard, this report must be used to refine building location, layout and design as appropriate and salinity prevention and management measure must be addressed in development applications submitted to the consent authority. Some measures that could be considered include:

Building Slabs/Concrete

- C6. In order to prevent moisture rising through the slab, firstly lay a thick layer of sand on the building site. Next, lay a damp-proof membrane of thick plastic.
- C7. Concrete can be made more resistant to salinity by increasing its strength to reduce the permeability. A sulfate resistant concrete can also be used which will reduce reinforcement corrosion. A minimum of 65 millimetres of concrete cover on strip or slab reinforcement is recommended in saline environments. Compaction and curing of the concrete are also advised.

Bricks

- C8. A brick damp course which is correctly installed will prevent moisture moving into the bricks. It is possible to use exposure quality bricks which are more resistant to water

Pemulwuy Industrial

and salt. Waterproofing can also be added to the mortar to prevent water entry.

Parks and Gardens

- C9. Plant gardens which do not require a lot of watering. This includes use of native plants which do not require excess watering, deep rooted trees to prevent the ground water table rising, the use of mulch, and the reduction of lawn areas. See section Landscaping above.
- C10. Where automatic watering systems are installed, measure soil moisture content to ensure they work, and to counter the possibility of over-watering.
- C11. Do not locate gardens close to buildings, as watering may affect foundations or render the dampcourse ineffective.

Site Design

- C12. Avoid disturbance of natural flow lines, as this is where the salinity is first likely to appear. This includes retaining native vegetation along watercourses and rehabilitation of disturbed areas using native vegetation.
- C13. Minimise throughflow when designing stormwater management, and this includes the careful design and construction of detention and retention basins to avoid high velocity runoff and soil erosion in susceptible areas.

7.9. Noise Impacts

Objectives

- O1. To reduce road traffic noise.
- O2. To limit noise impacts from vehicle traffic upon nearby and adjoining residential land.
- O3. To implement a strategic approach in new industrial areas to ensure that amenity objectives are not compromised.
- O4. To achieve an equitable share of the amenity, as per The NSW Government's Industrial Noise Policy.
- O5. To more evenly distribute allowable amenity noise limits amongst the employment sites.
- O6. To minimise the risk of adverse cumulative impacts.
- O7. To provide some flexibility in sharing the noise within each zone.
- O8. To ensure that the use of the land does not create an offensive noise or add significantly to the background noise level of a locality.

Pemulwy Industrial

Development Controls

Road Traffic Noise

- C1. Construct the north-south spine road and the east-west road in a manner that minimises road traffic noise. Utilise the range of road design measures within the NSW Government's Environmental Criteria for Road Traffic Noise (ECRTN).
- C2. Permit bus only access on the east-west road between the residential and industrial areas prior to the establishment of the North-South spine link.
- C3. Before opening the east west road to other classes of traffic the consent authority must consider the noise impacts likely to arise, in particular, whether the ECRTN criteria relevant to the northern residential area will be exceeded.

Industrial Noise Controls (west of Clunies Ross Street)

- C4. Employment lands in the Pemulwy have been divided into 5 noise zones for the purpose of managing noise impacts (See Figure 11). Each zone has an amenity limit that should not be exceeded (by all sites operating within that zone) at any residential receiver. The limits for each zone are shown in Figure 11 are set out in Table 2. Note that this map may be out of date, and that measures must be taken at the "Nearest Affected Residential Location", whether that residence has been constructed or not.

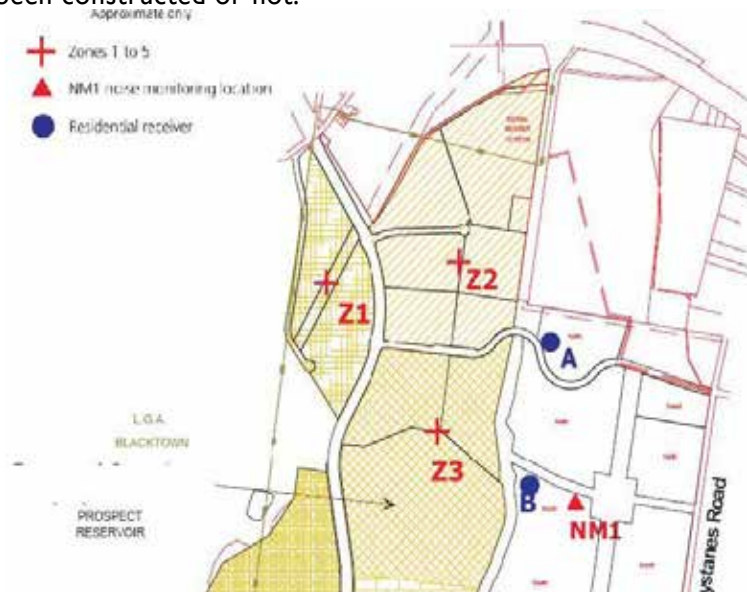


Figure 10: Noise zones-Pemulwy North Employment Lands

Period	Noise from Zone 1	Noise from Zone 2	Noise from Zone 3	Noise from Zone 4	Noise from Zone 5	Residential Noise Criterion
Day	50 dBA	50 dBA	49 dBA	49 dBA	51 dBA	55 dBA
Evening	40 dBA	40 dBA	39 dBA	39 dBA	41 dBA	45 dBA
Night	35 dBA	35 dBA	34 dBA	34 dBA	36 dBA	40 dBA

Pemulwuy Industrial

Industrial Noise (the former CSIRO land)

- C5.** The noise criteria presented in Table 3 is applicable to the residential receivers on the former CSIRO land.

Time of Day	Intrusive LAeq (15 minute) Criterion	Amenity LAeq (period) Criterion
Day – 7am – 6pm	51	47
Evening – 6pm – 10pm	51	44
Night – 10pm – 7am	46	42

- C6.** Site garbage collection, machinery, parking areas, and air conditioning plants away from adjoining residential area and where necessary, screen them by barrier or other acoustical treatment.
- C7.** Where the residential interface is not shielded from employment generated noise by employment buildings (south-west corner), provide a noise barrier to allow for acceptable acoustic outcomes at the residential receiver (see above table);
- C8.** Incorporate acoustic measures, such as an acoustic barrier, into the built form to mitigate noise impacts on the adjacent residential lands.
- C9.** Accompany all Development Applications for potential noise generating industries adjacent to residential zoned land with documentation from a qualified Acoustic Engineer specifying noise standards.
- C10.** Ensure compliance with the relevant requirements such as the Noise Guide for Local Government New South Wales Industrial Noise Policy.
- C11.** Comply with Acoustic Standards: Noise Limits (Table 7.7.2 from Noise Impact Assessment by Richard Heggie Associates Pty Ltd) measured at the residential boundary.
- C12.** Provide a noise impact assessment with Development Applications that propose activities with operating hours outside Council's standard business hours.
- C13.** Note: 24 hour operation of business use is permissible providing the residential receiver noise criteria (as mentioned above) are achieved.

7.10. Air Quality

Objectives

- O1. To ensure no adverse impacts on residences both within and surrounding Pemulwuy.
- O2. To ensure minimal emissions.

Development Controls

- C1. Provide air quality control measures during and after development of the Estate.
- C2. Address the relevant air quality guidelines within each development application in the employment area for industrial uses.
- C3. During construction, implement appropriate mitigation measures such as truck washing bays and wetting of dirt roads.
- C4. Ensure that the use of any premises and machinery is in accordance with the Protection of the Environment Operations Act 1997.
- C5. If any proposed use or activity within the site falls into Schedule 1 of the Protection of the Environment Operations Act 1997, the occupier must hold a licence from the NSW OEH, or its equivalent.
- C6. Within the Statement of Environmental Effects of a Development Application, include an assessment of air quality according to EPA standards.
- C7. Ensure that the endorsement of any machinery used does not result in air pollution emissions that exceed EPA guidelines.

Appendix A- Stormwater Management Plan

STORMWATER MANAGEMENT

A.1 INTRODUCTION

Stormwater management measures will be required as part of the development of the employment lands to protect the water quality of downstream creeks. The site is to be divided into two main catchments these are:

- the Northern Employment Lands, approximately 82 hectares, that drain to the Greystanes Creek; and
- the Southern Employment Lands, approximately 134 hectares that drain to Prospect Creek.

Development of site will increase the flow volumes and pollutant loads discharged to these creeks. Greystanes Creek is a tributary of the Toongabbie Creek and is located in the upper Parramatta River catchment. A stormwater management plan was prepared for this catchment by the four catchment councils and the Upper Parramatta River Catchment Trust.

The Southern Employment Lands are located in the Prospect Creek catchment. Fairfield, Holroyd, Bankstown and Liverpool Councils have prepared a stormwater management plan for this catchment. The stormwater management plans provide pollutant retention criteria for new developments and rank treatment objectives for various types of developments.

Currently it is anticipated that the majority of the employment lands will be developed for a range of uses which would typically include warehouses, transport facilities, distribution centres, manufacturing and supporting offices. The minimum lot size is one hectare.

A.2 STORMWATER MANAGEMENT OBJECTIVES

Stormwater management objectives for water quality for new urban areas are set out in Council's stormwater management plans. These objectives include measures to manage pollutants generated during the construction and operational phase of the development. Stormwater management measures for the Greystanes Estate also address the issue of water quantity.

A.2.1 Construction Objectives

Sediment and Erosion control plans are required for new developments to prevent pollution of the creeks during the construction phase of the development. The plans are required to be prepared in accordance with the manual 'Managing Urban Stormwater: Soils and Construction' (NSW Department of Housing, 1998). Measures that will be implemented include:

- staging development activities to minimise land disturbance;
- limiting earthworks and disturbance of stable rehabilitated landforms;
- diversion of clean run-off from upstream areas around disturbed areas;
- stabilise and vegetate areas immediately following the completion of works;
- provide sediment basins, fences, catch drains, check dams and other structures to collect and treat run-off from disturbed areas;
- sediment basins sized for the 1 in 3 month design storm based on the majority of fill materials being coarse-grained;
- monitoring discharges from sediment basins and flocculation as required to limit TSS concentrations in water discharged from the basins to 50 mg/L;
- vegetated buffer strips around all water bodies and drainage channels;

Pemulwuy Industrial

- temporarily stabilisation of stockpiles and disturbed areas, not associated with the on-going quarry operations, exposed for more than 15 days; and
- restricting vehicle access to designated entry and exit points.

A.2.2 Operational

The treatment objectives for Prospect Creek and the upper Parramatta River catchments are listed in Table A.1 and Table A.2 respectively.

The range of urban land uses produce different types and quantities of pollutants and consequently the stormwater treatment strategies used to mitigate these impacts vary depending on the type of development proposed. To assist in selecting the appropriate treatment strategies the Upper Parramatta River Stormwater Management Plan (SMP) ranks the treatment objectives for a range of urban land use based on their importance for that particular land use. Rankings provided in the listed in Table A.3 below.

The stormwater management strategy for a new development is required to address all the listed pollutants, however in the case of an industrial development only the pollution retention criteria for objectives ranked (a) to (e) need to be met.

A.3 STORMWATER MANAGEMENT STRATEGY

A.3.1 Stormwater Management Principles

Stormwater management principles listed below for the employment lands have been developed to meet water quantity objectives, the water quality treatment objectives set out in the SMP's and to address the broader issues of water sensitive urban design. Key stormwater management principles to be used in the design of stormwater management systems in the employment lands are:

- stormwater management systems will be incorporated in the initial stages of design;
- on-site stormwater management measures will be used, where feasible to meet catchment wide water quality objectives;
- the proposed stormwater management measures will incorporate, where feasible, natural treatment mechanisms and features;
- integration of the public open space with the trunk stormwater drainage corridors;
- on-site stormwater reuse will be encouraged to minimise pollutant exports and reduce the hydrologic impacts associated with the development;
- stormwater systems designed so that there are no linkages between surface and groundwaters to minimise the risk of contamination of surface waters by potentially saline groundwaters;
- the results of the monitoring program required by Section 7.7 of this Plan should be used to inform surface water management practices as required;
- development should be designed so that downstream flows off-site are not adversely affected.
- For the Northern Employment Lands, avoid any increases in flood peak flows, velocities and water levels at all downstream points in the full range of flood

Pemulwuy Industrial

magnitudes, taking into account the planned developments on the adjoining sites and modifications to the DUAP basin.

- For the Southern Employment Lands, avoid any increases in flood peak flows and velocities at all downstream points in the full range of flood magnitudes, taking into account the planned
- developments on the adjoining sites.

These principles are designed to meet the following key objectives:

- limit stream velocities to prevent erosion and scour of local waterways;
- reduce pollutant loadings to maintain downstream water quality;
- prevent the contamination of surface water or groundwater by stormwater run-off;
- reduced demand for imported mains water by water conservation measures and re-use of stormwater;
- protection of downstream aquatic ecosystems and riparian vegetation; and
- enhance the scenic and recreational value of creek corridors and water quality control ponds.

A.3.2 Stormwater Plan

A stormwater plan will be prepared to accompany the development applications for the employment lands.

The stormwater plan for the sub-division of the land will address issues associated with the conveyance and discharge controls. Source controls will be designed at the development application stage for the individual lots. In summary the controls are:

- Source Controls- controls applied to the individual lots to address specific pollutants associated with the specific development;
- Conveyance Controls - controls applied in the local and trunk drainage systems these include grass swales, and streams incorporating ponds, riffle zones and macrophytes; and
- Discharge Controls - controls prior to discharge from the estate prior to run-off flowing into the creeks. These include gross pollutant traps, wetlands and water quality control ponds.
- i. Source Controls
- A range of source controls can be used to minimise the pollutant loads discharged from the individual development lots. The type of controls adopted will depend on the nature of the development. Stormwater management plans will be prepared and submitted with the development applications for the individual lots.
- Pollution Prevention - Minimise the amount of impervious areas on the site, bund and roof all chemical and fuel storage areas, roof vehicle servicing and refuelling facilities, separate run-off from 'clean' and 'dirty areas' of the site.
- Stormwater Harvesting – Maximise the amount of stormwater run-off used on-site. Investigate the feasibility of re-using stormwater run-off for dust suppression systems, vehicle washing and wheel washes, and irrigation of landscaped areas of the site.

Pemulwuy Industrial

- Oil/Water and Oil/Grit Separators - Oil/water and oil/grit separators and first flush basins are to be used to treat run-off from 'dirty' areas of the site. These systems will be designed to meet the pollution retention criteria for hydrocarbons and coarse sediment in Tables A.2 and A.3. Oil/grit separators are to be provided for all site car parks with more than 12 spaces. Treatment devices are to be sized to treat the run-off from the 90th percentile rainfall event, (BCC 2001).
- Buffer Strips - Approximately 15% of the lots will be landscaping. Where the site layouts allow the landscaping will be used to treated run-off from the primary treatment devices. Vegetated buffer strips will be used to reduce the amount of fine sediment and nutrients discharged from the site to the wetlands and water quality control ponds. Research by the CRC for Catchment Hydrology on vegetated buffer strips found that a six metre wide strip can reduce sediment loads by up to 90% and nutrient loads by up to 70%, (CRC 1997).

ii. Conveyance Controls

- Grass Swales – In the detailed design of the sub-division open grass swales can be used in preference to conventional kerb and gutter and pipe drainage. Swales reduce flow velocities limiting erosion of the stream banks. The lower velocities and filtration through vegetation reduces fine sediments, nutrients, hydrocarbons and heavy metals discharged to the treatment ponds.

Typical pollutant removal rates are; total suspended solids – 75 -100%, hydrocarbons 75-100%, nutrients - 50-75%, and heavy metals – 60%, (EPA 1997a).

- Watercourse Profiles – Three main watercourses will be provided through the site to collect stormwater run-off. Two for the southern employment lands draining to the southern water quality control ponds and the second drains to the northern water quality control ponds. Where feasible, the watercourses will include a meandering low flow invert, ponds and riffle zones, and aquatic and riparian vegetation.

iii. Discharge Controls

- Gross Pollutant Traps – Gross pollutant traps incorporating a screen and coarse sediment sump will be provided upstream of the ponds and wetlands. These will be designed to achieve the pollutant reduction targets set out in Tables A.2 and A.3 for coarse sediment and litter.
- Constructed Wetlands and Water Quality Control Ponds - Wetlands and ponds will be provided for tertiary treatment of stormwater before it is discharged from the estate to Prospect Creek or Greystanes Creek. The wetlands and ponds have been sized to meet the treatment objectives for sediments and nutrient outlined in the stormwater management plans. The ponds and wetlands would be located off-line with a bypass channel used to divert flows during large storms around the ponds. The ponds, where feasible, should consist of a series of shallow densely planted zones and deep water areas.

The relationship between the three levels of stormwater treatment in the treatment train approach is shown in Figure 11 below.

A.4 STORMWATER POLLUTION LOAD ASSESSMENT

To provide preliminary sizes for the water quality ponds, a level one pollution load assessment was completed, as defined in the EPA guidelines, (EPA 1997c). This level of

Pemulwuy Industrial

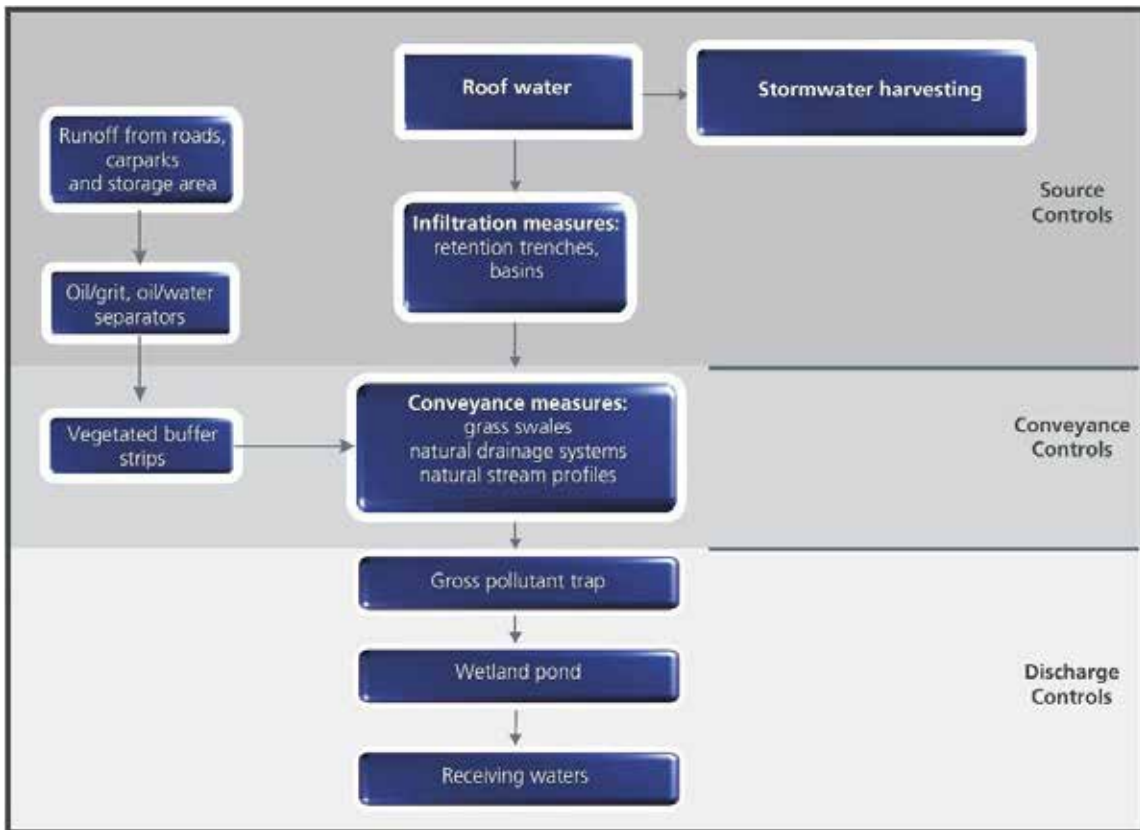


Figure 11: Stormwater Management System

stormwater quality model is suitable for preliminary sizing, but given the size and scales of the development would need to be supported by a more detailed, level two water quality model, at the detailed design phase.

For the purposes of the modelling existing pollutant loads were estimated assuming that the entire area of the quarry was a rural catchment. Due to the lack of site specific water quality data Event Mean Concentrations (EMC's) based on the Sydney Water's water quality monitoring data for a range of land uses in the catchment. No EMC data is available for quarries so average rural EMC values have been used. This is a conservative approach and under-estimates the existing pollutant loads.

Pollutant loads after development with no controls were estimated using average EMC values for industrial catchments. The surface area of wetland/water quality control ponds necessary to achieve the pollutant reduction targets was then calculated. Pond sizes have been calculated based on achieving two levels of treatment the first is the treatment objectives outlined in the SMP's and the second is to reduce postdevelopment pollutant loads to the rural pollutant loads. Wetland surface areas were estimated using the surface loading rates included in the EPA's guidelines 'Managing Urban Stormwater Treatment Techniques'. These are described as Option 1 and Option 2 respectively in the tables below. Details of the pollution load assessment are included in Appendix A of this paper and summary of the results are provided in Tables A.4 – A.6.

Pemulwuy Industrial

A.5 RECOMMENDATIONS

Staged sediment and erosion control plans should be prepared for the development of the infrastructure for the employment lands. Sediment and erosion plans should also be submitted with the individual development applications for the lots. The plans should be prepared in accordance with the guidelines published by the NSW Department of Housing 'Managing Urban Stormwater Soils and Construction'.

The stormwater management strategy outlined in Section A.3.2 should be adopted for the site so that the water quality objectives set in the relevant SMP's are met and exceeded. These measures include a 'treatment train' approach with site specific controls included on the individual lots and conveyance and discharge controls included during the design of the infrastructure for the employment lands. Water quality control ponds (WQCP) are to be included in both the northern and southern employment lands. These are to have a minimum surface area of 1.4 and 2.0 hectares respectively. WQCP's will be designed to achieve the treatment objectives set out in both the Prospect Creek and Upper Parramatta River SMP's for suspended solids and nutrients for the Southern Employment lands and Northern Employment Lands respectively. Approximately 50% of the water quality control ponds are to be shallow wetland area planted with appropriate species of emergent macrophytes. The remaining areas are deeper open water zones. The ponds should have a minimum hydraulic retention time of twelve days.

The effectiveness of the proposed stormwater management measures is to be confirmed using more detailed water quality modelling. The model should use appropriate EMC values, a daily time step and a ten year simulation period that incorporates years with rainfall totals similar to the 10th, 50th and 90th percentile years, (EPA 1997c).

A.6 REFERENCES

Bankstown, Fairfield, Holroyd and Liverpool City Councils, 1999 Prospect Creek Catchment Stormwater Management Plan

BCC 2001 Blacktown City Council, 2001 Stormwater Quality Control Policy

CRC 1997 Cooperative Research Centre for Catchment Hydrology, 1997 Controlling Sediment and Nutrient Movements within Catchments - Industry Report.

Cooperative Research Centre for Catchment Hydrology, 1997 Urban Stormwater Pollution - Industry Report.

Cooperative Research Centre for Catchment Hydrology, 1998 From Roads to Rivers. Gross Pollutant Removal from Urban Waterways.

EPA 1997a Environment Protection Authority, November 1997 Managing Urban Stormwater. Treatment Techniques.

EPA 1997b Environment Protection Authority, April 1997 Managing Urban Stormwater. Strategic Framework. Draft.

EPA 1997c Environment Protection Authority, November 1997 Managing Urban Stormwater. Council Handbook. Draft.

Pemulwuy Industrial

Environment Protection Authority, December 1998 Managing Urban Stormwater. Source Control. Draft.

New South Wales Department of Housing, August 1998 Managing Urban Stormwater: Soils and Construction

Lower Hunter and Central Coast Regional Environmental Management Strategy, 1999 Water Sensitive Urban Development. Implementation Issues for the Lower Hunter & Central Coast.

Patterson Britton and Partners, January 2000 Greystanes Estate General Services Plan

PPK Environment and Infrastructure, April 2001 Drainage Services Plan for the Employment Land

Upper Parramatta River Catchment Trust, July 1999 Upper Parramatta River Catchment Trust Stormwater Management Plan