

infrastructure & development consulting

Western Sydney Aerotropolis Local Infrastructure Contributions Plan

Background Report

October 2020

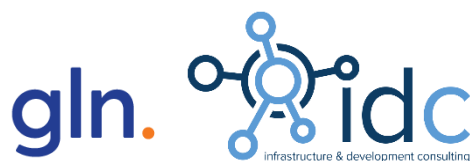


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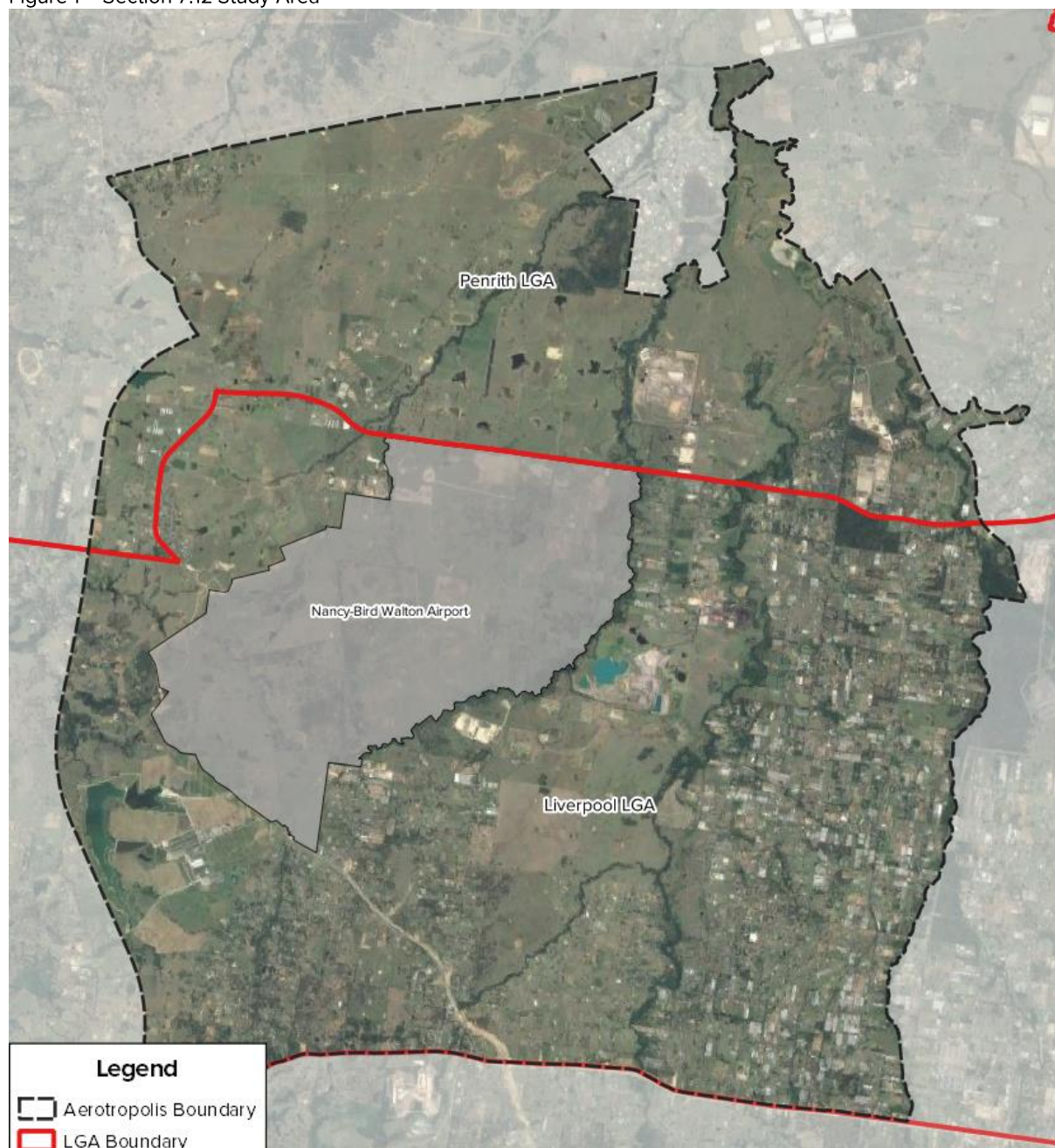
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1 Introduction

This report has been prepared by infrastructure & development consulting Pty Ltd (IDC) for Liverpool City Council and Penrith City Council to assist in the preparation of a joint Section 7.12 Contributions Plan to meet the cost of local infrastructure across the Western Sydney Aerotropolis Initial Precincts.

This report provides a summary of the determination of the extent of local infrastructure required to support the development of the Aerotropolis as well as the methodology and calculations for the submission to the Minister for Planning and Public Spaces to justify Liverpool and Penrith Councils' request to implement a Section 7.12 levy in excess of 1% of the cost of development. The Study Area is shown in Figure 1 below.

Figure 1 – Section 7.12 Study Area



2 Purpose & Assumptions

2.1 Purpose

This Contributions Plan (CP) has been developed to allow for development contributions to be levied against development within the Western Sydney Aerotropolis Precincts. As outlined in the Aerotropolis SEPP, development consent cannot be granted until a local contributions plan is in place.

This Section 7.12 Plan has been prepared to ensure that development can occur in advance of detailed, precinct level planning.

It is intended that this will be reviewed and updated periodically as Precinct Planning is undertaken and further, more detailed information becomes available.

2.2 Assumptions

A number of assumptions have been made to assist in the preparation of this Section 7.12 Plan:

- This CP only applies to land contained within the Initial Precincts of the Western Sydney Aerotropolis, as outlined in Section 4.1 of this report
- The Sydney Science Park has been excluded from this Section 7.12 Plan. It has been assumed that all local infrastructure required to support development in the Sydney Science Park will be provided through a Voluntary Planning Agreement that has been entered into between Celestino and Penrith City Council
- The Wianamatta South Creek Corridor has been excluded from this Section 7.12 Plan. It has been assumed that any land acquisition, environmental rehabilitation works and active transport infrastructure located within this Precinct will form part of the Special Infrastructure Contribution plan
- Population and job projections for each Precinct have been extracted from the Western Sydney Aerotropolis Plan (WSAP). Upper range values have been adopted to provide a worst-case estimate of the infrastructure requirements
- A constrained land budget of 15% has been applied to the total site area to determine the Developable Area to allow for flooding, heritage, vegetation, etc.
- Standard development typologies were determined for each land zoning. These typologies were based on the WSAP and comparisons to surrounding areas
- Dwelling densities for high density development have been extracted from the Stage 1 LUIIP
- Dwelling densities for medium density development are based on a review of other Local Contribution Plans, ABS data and GSC projections
- Dwelling occupation rates are based on a review of other Local Contribution Plans, ABS data and GSC projections
- Assumed job densities for employment development typologies have been based on reporting prepared by SGS economics
- Typical road cross sections have been extracted from the Western Sydney Street Design Guideline (Final Draft version dated 18 June 2020)
- Detention and water quality cost and provision rates have been based on an IPART review of Contribution Plans titled *Assessment of Revised Section 94 Contributions Plan No 21 – Marsden Park*
- Land acquisition rates have been based on work undertaken for the Western Sydney Planning Partnership as provided by Atlas Urban Economics

Detailed assumptions are contained within Appendix A.

3 Criteria to Request a Higher S7.12 Percentage

In April 2020 the NSW Government released a discussion paper on the criteria for Council's to request a higher Section 7.12 Levy rate than 1%. Although this has not been implemented, we offer the following demonstration of compliance with these criteria:

Table 1 – Compliance with Criteria to Request a Higher Section 7.12 Percentage

Criteria	Complies	Comment
C1.1 The area must be identified in the relevant strategic plan	Yes	The Western Sydney Aerotropolis SEPP and Western Sydney Aerotropolis Plan (WSAP) have identified the entire area proposed for this Section 7.12 Plan.
C1.2 The strategic plan must include a significant employment growth target for the centre	Yes	The WSAP has identified a goal of 102,000 for the Precincts related to this Contributions Plan (Aerotropolis Core, Northern Gateway, Agribusiness and Badgerys Creek Precincts)
C1.3 Local planning controls must reflect relevant strategic direction and targets for the centre	Yes	This proposed Contributions Plan is based on the population and jobs forecasts in the WSAP.
C1.4 The contributions plan should focus primarily on delivering quality place-based community infrastructure and improvements that enhance amenity of the centre	Yes	The proposed Contributions Plan has been based on the draft Western Sydney Street Design Guidelines, Social infrastructure provision rates and drainage studies undertaken by Councils, Sydney Water and the Western Sydney Planning Partnership.
C1.5 Plan administration cost must not exceed 0.2% of total value of the contributions plan	Yes	An Administration fee of 0.2% has been applied to the plan.
C1.6 The contributions plan should clearly set out the relationship between the expected types of development in the area and the demand for additional public amenities and services	Yes	This report shows the nexus between the forecast population, jobs, development and their required infrastructure.
C1.7 Demonstrate that s7.11 has been considered and why it is not appropriate in this area	Yes	A section 7.11 plan has been considered for the area but is not possible to be implemented due to the flexible zoning controls in the Western Sydney Aerotropolis SEPP. Until a clear spatial plan of the proposed development across the precincts and the associated infrastructure a Section 7.11 plan cannot be prepared. Where this information is available (i.e. Mamre Road Precinct) a Section 7.11 plan has been prepared.
C1.8 Include a financial analysis that demonstrates a 1% fixed levy is insufficient, and forecast the revenue outcomes for a higher percentage levy	Yes	This report and associated worksheets show the infrastructure scope and cost estimates.
C1.9 Changes to the works schedule require approval from the Minister	Yes	We acknowledge ongoing monitoring and review of eligibility for the higher maximum percentage.
C2.1 The contribution plan must include funding and delivery of district-level infrastructure, representing at least 10% of total value of the contributions plan	Yes	This plan includes several district-level infrastructure items including district parks, sports fields, aquatic centre, major riparian corridors that comprise over 12% of the value of the plan.
C2.2 The works schedule must be prepared in consultation with the Department to identify potential district level infrastructure	Yes	We have been in consultation with both DPIE and PPO regarding our works schedule and no objection has been raised to date on the proposed infrastructure

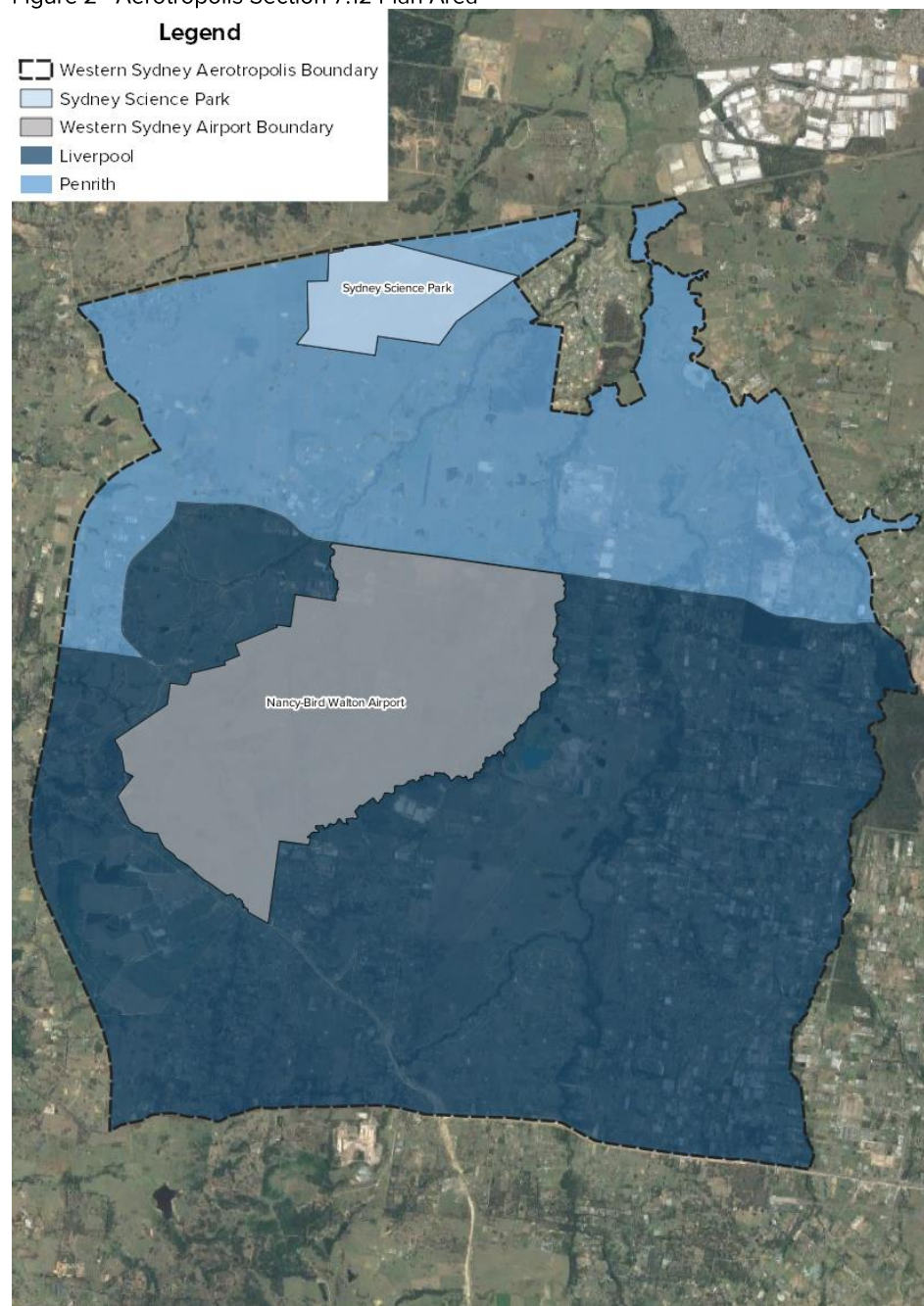
4 The Study Area

4.1 Western Sydney Aerotropolis Section 7.12 Plan Area

The proposed CP applies to land within the Western Sydney Aerotropolis. The Aerotropolis is located within the Penrith City Council and Liverpool City Council Local Government Areas (LGAs). The Aerotropolis is centred around the Western Sydney Airport which will open in 2026. The Aerotropolis area is shown in Figure 2 below.

The Sydney Science Park, located within the Northern Gateway Precinct, has undergone significant planning, including an executed Voluntary Planning Agreement with Penrith City Council. The Sydney Science Park has therefore been excluded from the Section 7.12 Plan area.

Figure 2 - Aerotropolis Section 7.12 Plan Area

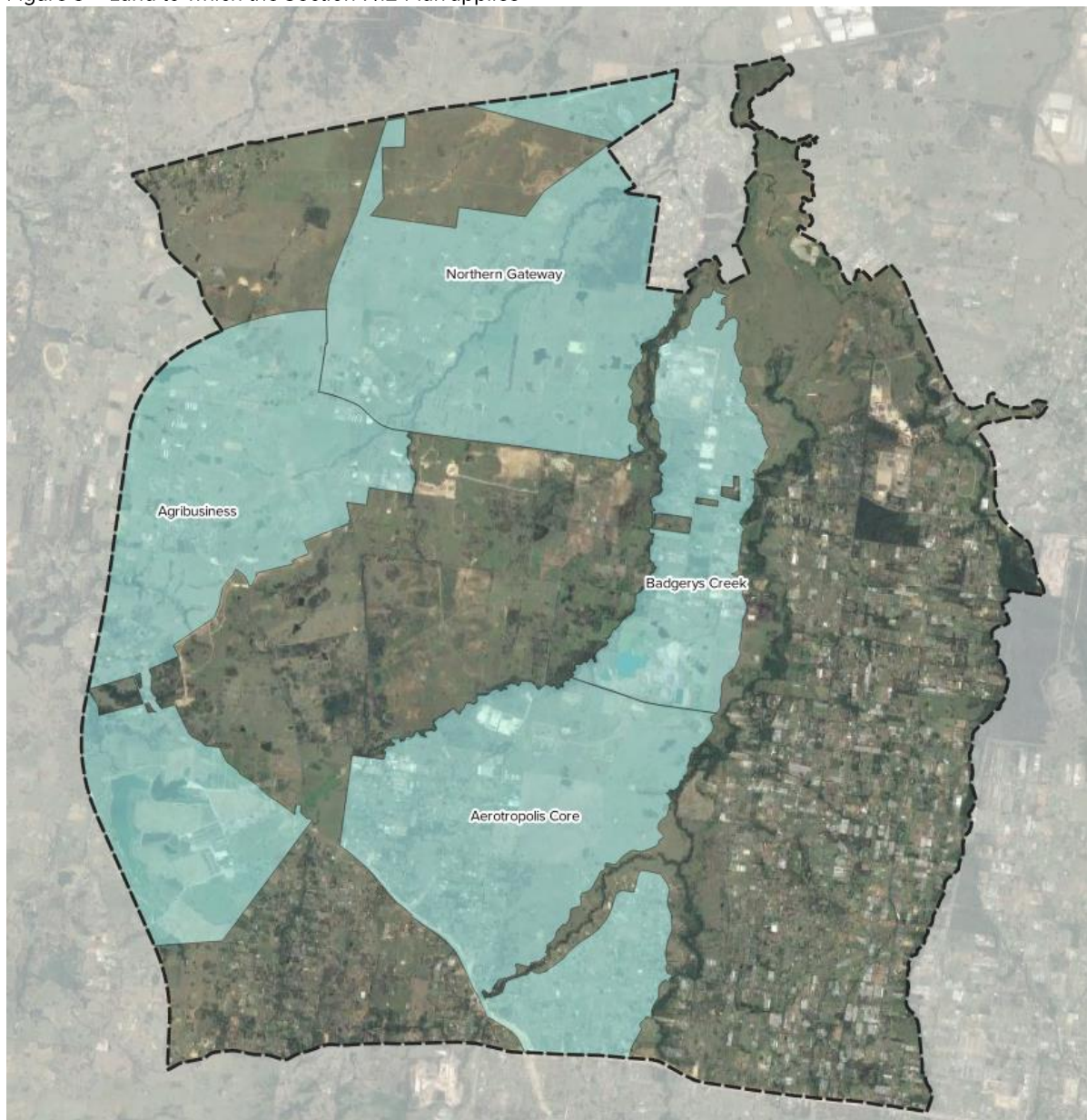


The *Western Sydney Aerotropolis Plan* prepared by the Western Sydney Planning Partnership outlines the vision and planning approach for the 9 precincts within the Aerotropolis. The plan sets out the sequenced approach to precinct planning that aims to optimise the investment in major infrastructure to activate the area.

The Aerotropolis plan identifies 9 precincts based on opportunities and constraints as well as likely future character and connectivity. Of the 9 precincts, five have been identified as “Initial Precincts” which have been brought forward to help create early employment opportunities and better coordinate infrastructure. The remaining four precincts will undergo planning at a later date.

Only the Initial Precincts are covered by this Section 7.12 Plan, with a further excision of the Western Sydney Airport and Sydney Science Park sites as is indicated in Figure 3 below. The Wianamatta-South Creek Precinct has also been excluded. It has been assumed that there is limited to no development potential in the precinct (as it is based on the 1 in 100 year flood extents) and any infrastructure associated with this Precinct may form part of the SIC.

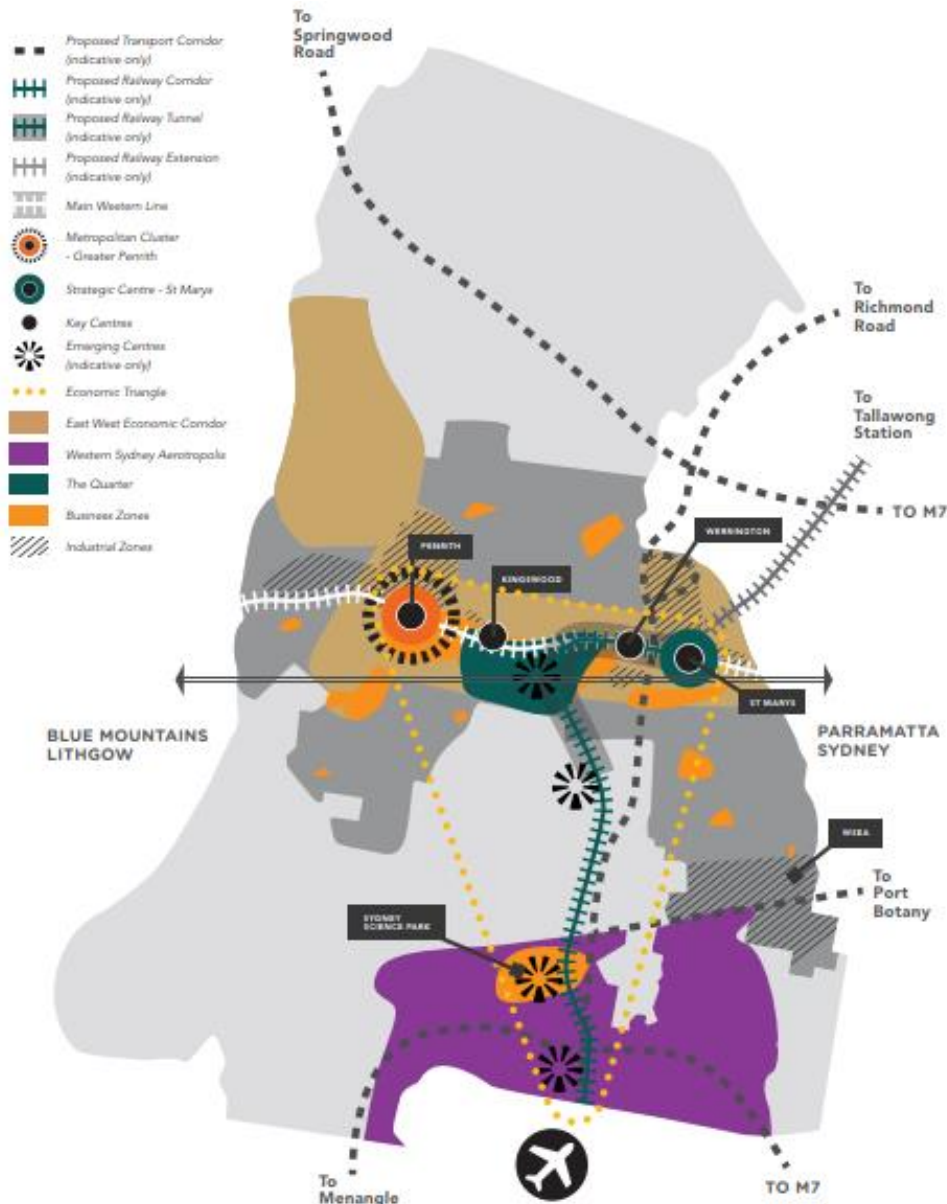
Figure 3 – Land to which the Section 7.12 Plan applies



4.2 The Penrith Economic Triangle

Parts of the Aerotropolis also fall within the southern portion of the Penrith Economic Triangle as outlined in Penrith City Council's *Local Strategic Planning Statement*. The Economic Triangle covers the area between Penrith CBD, St Marys and the emerging centres located to the north of Western Sydney Airport. The proposed North South Rail Link will present opportunities for a north-south economic corridor with new centres to be established around future stations. New centres will be guided by the principles of the Western City District Plan and will be built on principles of innovation and sustainability. The Penrith Economic Triangle is shown in Figure 4 below.

Figure 4 - Penrith Economic Triangle



5 Precincts, Zoning & Land Use

5.1 Land Zoning

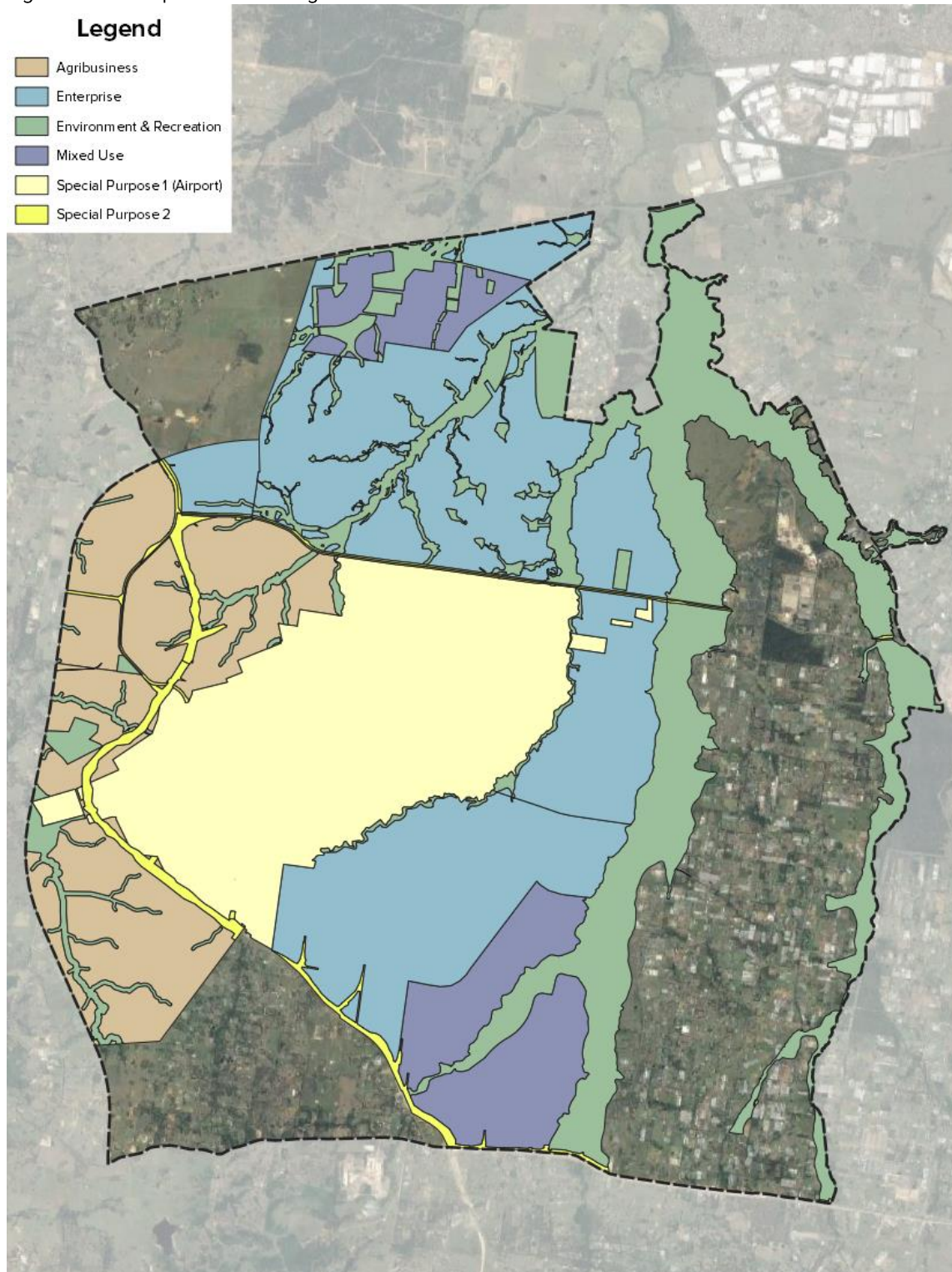
The Western Sydney Aerotropolis contains a number of flexible zoning types. The Western Sydney Aerotropolis Plan (WSAP) contained a brief outline of the flexible zones and the desired Development Typologies and is summarized in Table 2 below.

Table 2 – Proposed Land Zoning

Zone	Code	Description
Enterprise	ENT	Land where enterprise uses are supported while mitigating impacts of airport operations. Residential development and other noise sensitive uses are not permitted
Mixed Use	MU	Mixed flexible employment, residential and noise sensitive uses on land not affected by noise from the airport in high amenity areas well connected to public transport
Special Purpose 1	SP1	The airport and associated land to support airport operations and other special uses
Special Purpose 2	SP2	New and existing road and rail corridors, transport facilities and utilities. These areas will be further refined as additional infrastructure is required
Agribusiness	AGB	Land to support high-tech agribusiness uses including freight, logistics and horticulture
Environment & Recreation	ENZ	Applies to land affected by the 1 in 100 chance per year flood event and will create opportunities for amenity and recreation as well as some permitted uses

The distribution of these proposed assumed zonings used for this Plan are shown in Figure 5 while the proportion of each zoning and anticipated land uses are explained in more detail in Section 5.2.

Figure 5 - Aerotropolis Land Zoning Plan



5.2 Precinct Summaries

The WSAP Draft SEPP outlined the anticipated Zoning and supported land uses in each of the precincts. For each of the Initial Precincts, a brief outline of these has been provided below.

5.2.1 Aerotropolis Core

The Aerotropolis Core will be centred around a new Sydney Metro station and supported by retail, creative industries, civil and cultural facilities and open space. Residential communities and other sensitive land uses will be located outside areas impacted by aircraft noise.

Desirable land uses for the Aerotropolis Core include advanced manufacturing, defence and aerospace, research and development activity, high technology industry and infrastructure, education, professional services, commercial offices, medium to high density residential (near the Metro Station), entertainment & open space.

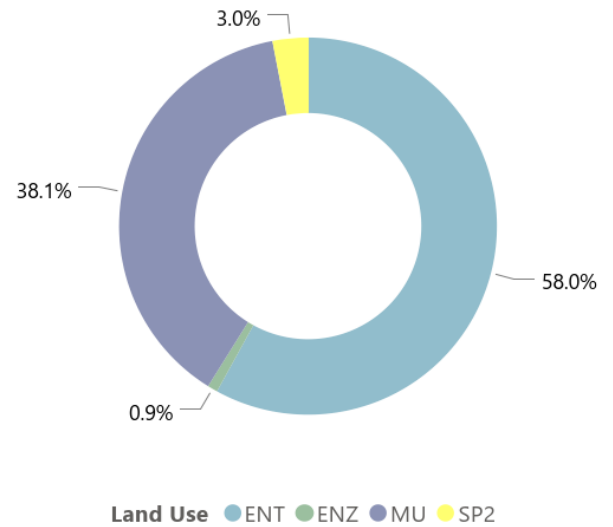
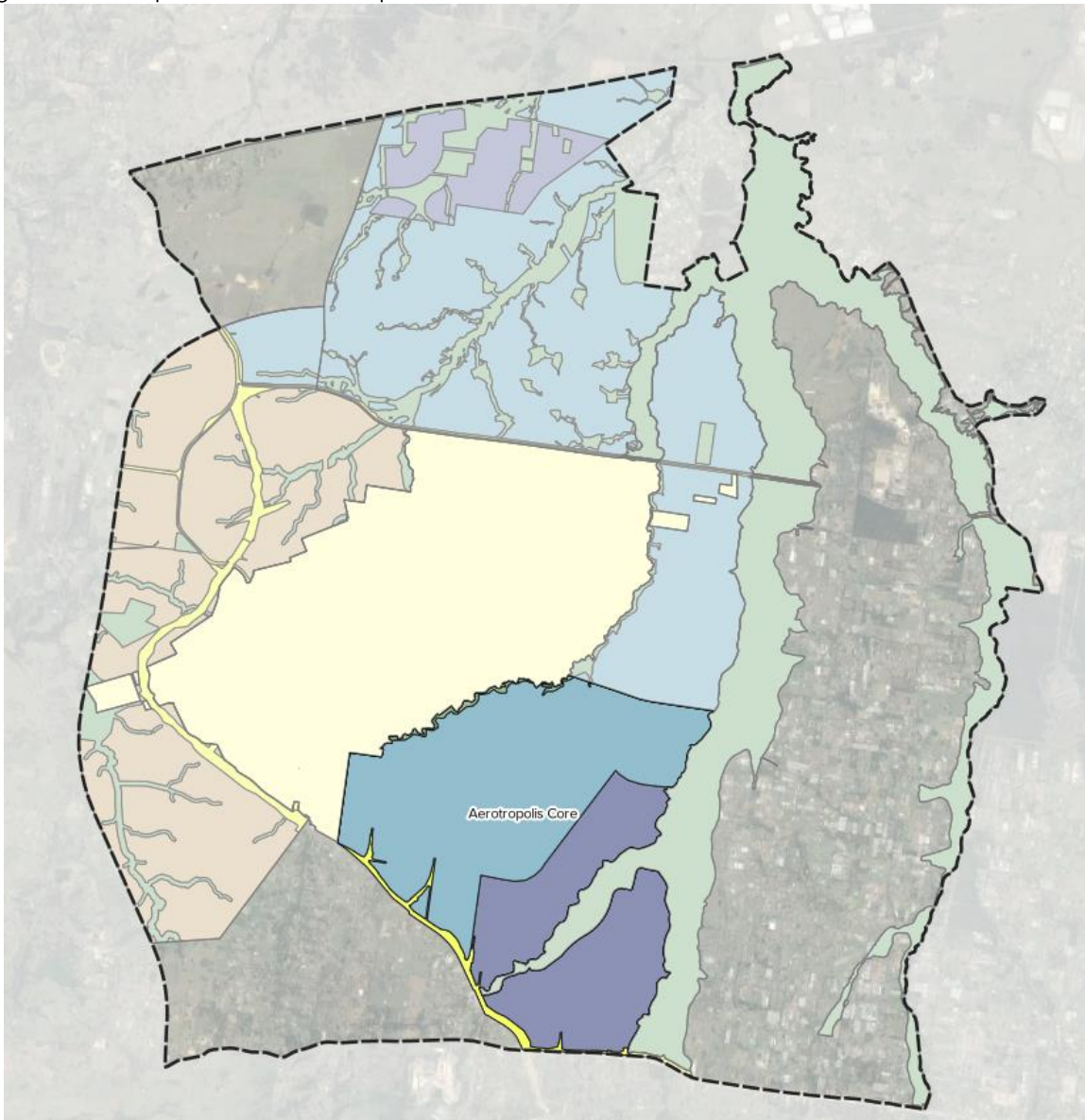


Figure 6 - Aerotropolis Core Precinct Map



5.2.2 Agribusiness

The Agribusiness precinct wraps around the western edge of the Airport and will support the long-term retention and growth of agriculture and agribusiness in the area. The precinct will retain significant peri-urban agricultural lands for production and enabling connections to the airport.

Desirable land uses include agribusiness, agriculture, intensive fresh and value-added food production, food innovation technology and research, food production and processing, fresh food produce markets, warehousing and logistics, high technology and offices and retail.

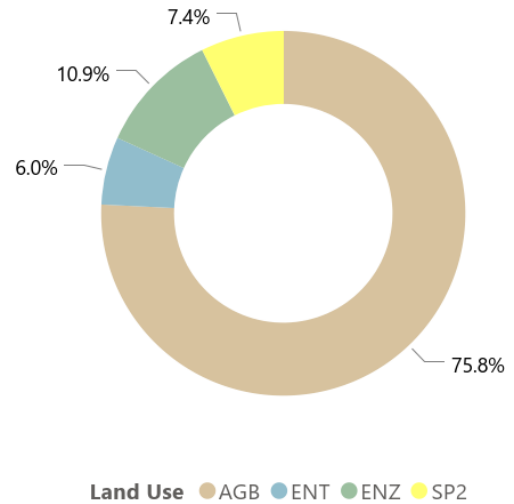
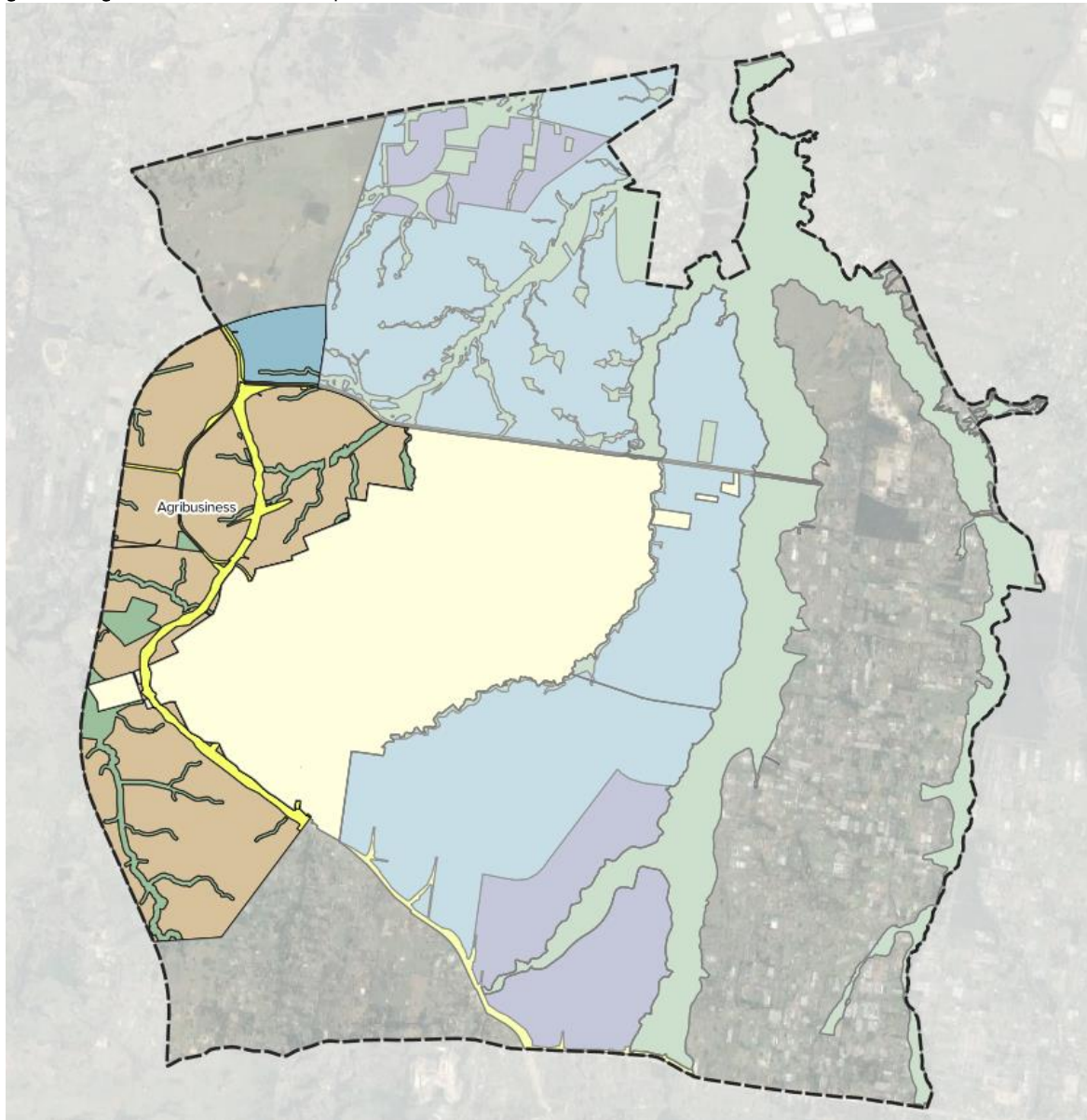


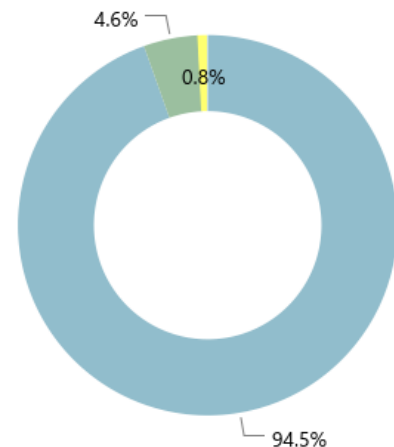
Figure 7 - Agribusiness Precinct Map



5.2.3 Badgerys Creek

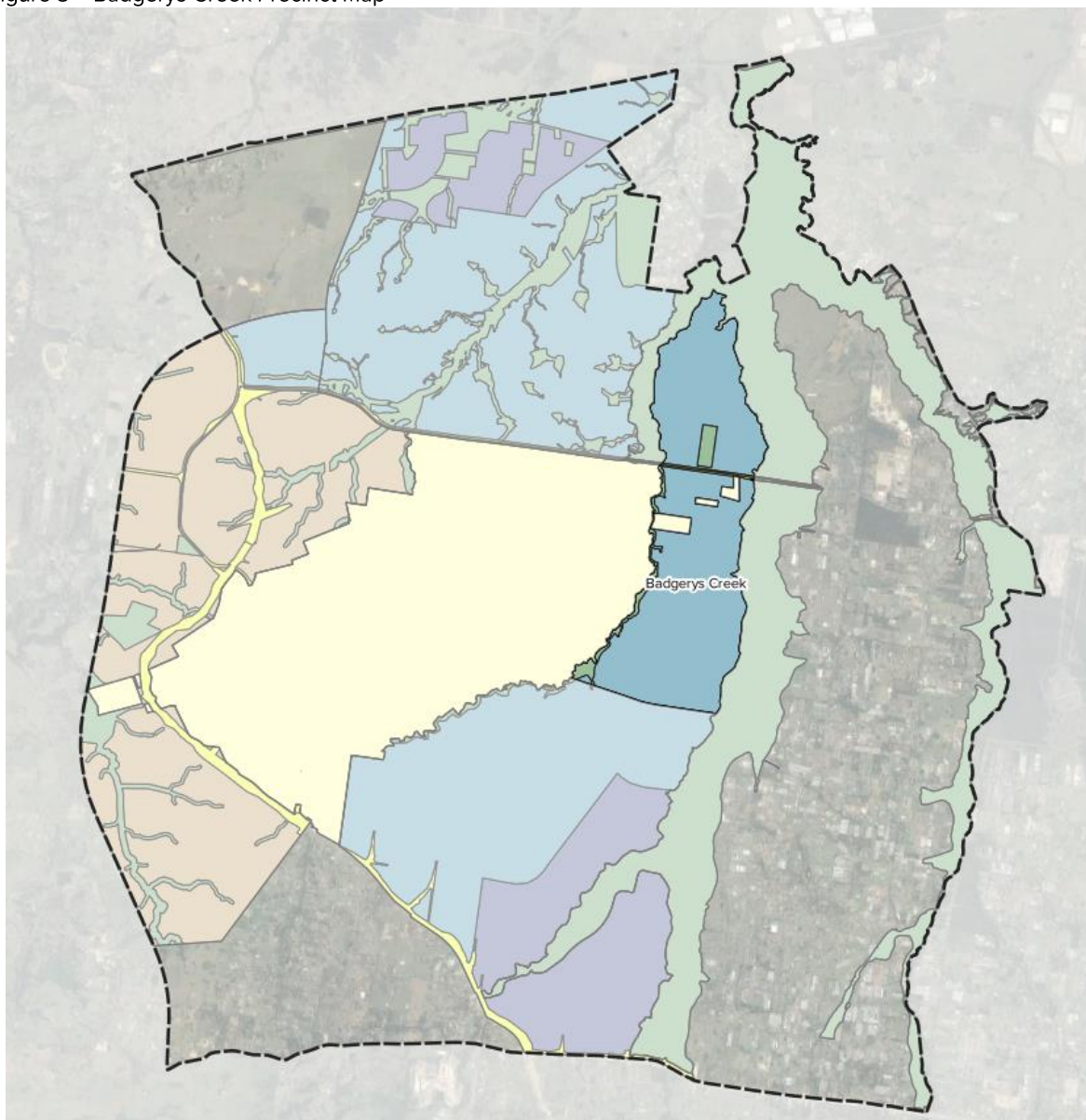
The Badgerys Creek precinct is located on the eastern side of the Airport, extending to the north, beyond Elizabeth Drive. The precinct will support airport operations, the urban centre within the Aerotropolis Core to the south and the Northern Gateway to the west. The precinct is not suitable for sensitive land uses such as residential, schools and hospitals.

Desirable land uses include defence and aerospace, advanced manufacturing activity, high technology industry, airport supporting development, local retail, light industrial and social infrastructure.



Land Use ● ENT ● ENZ ● SP2

Figure 8 – Badgerys Creek Precinct Map



5.2.4 Northern Gateway

The Northern Gateway will link the Airport with the Western Parkland City Metropolitan Cluster through high frequency public transport, freight, road and rail connections. The precinct will build on the approved Sydney Science Park development to provide a variety of residential and employment generating uses.

Desirable land uses include high technology commercial enterprise/industry, warehousing and logistics, education, offices, retail, residential, health services, entertainment, tourism facilities, etc.

Note that the Mixed-Use Zoning is wholly contained in the Sydney Science Park which is excluded from this plan.

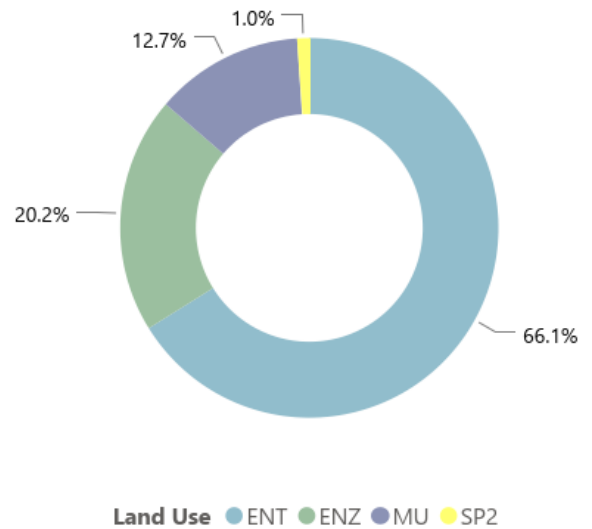
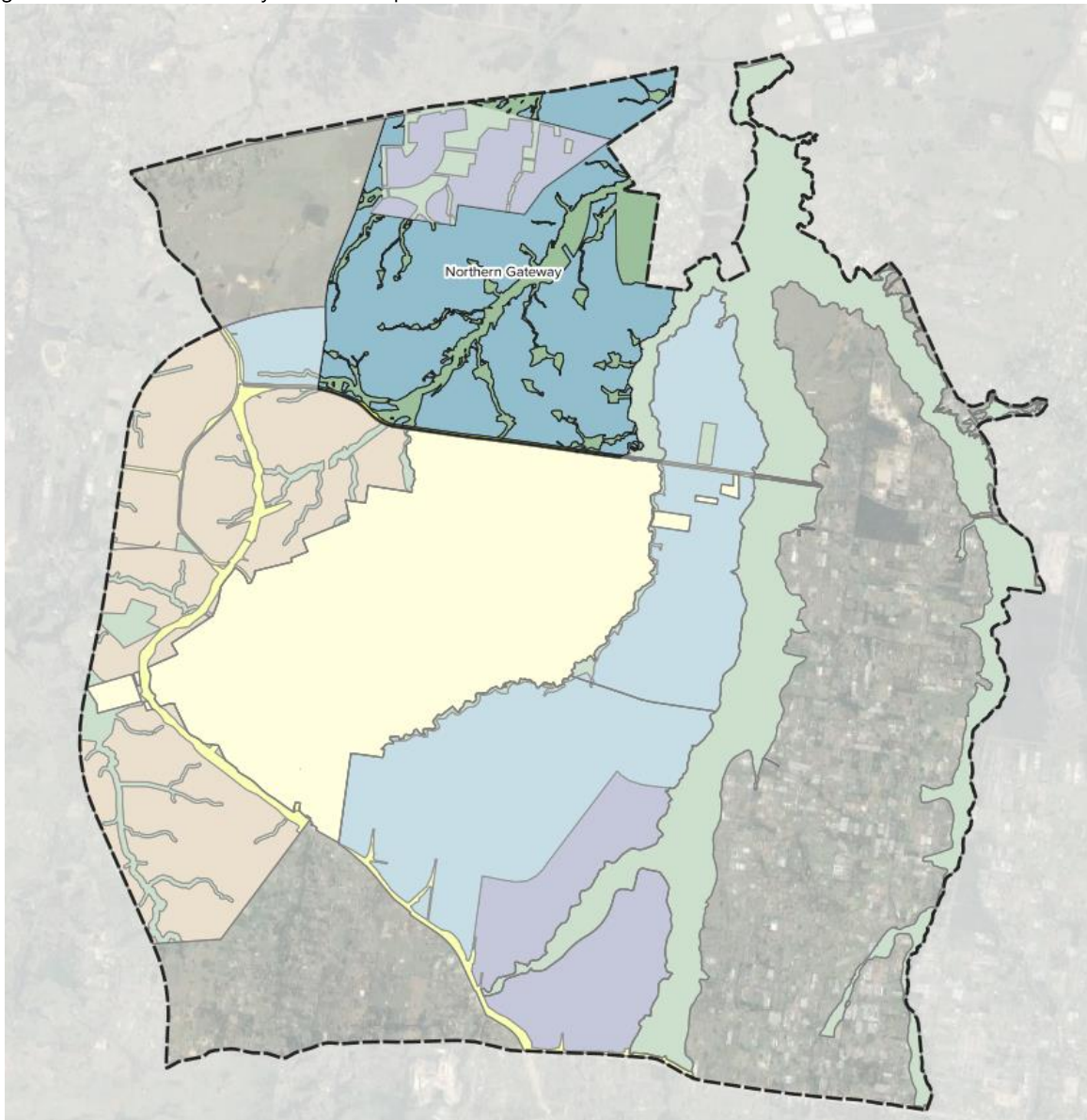


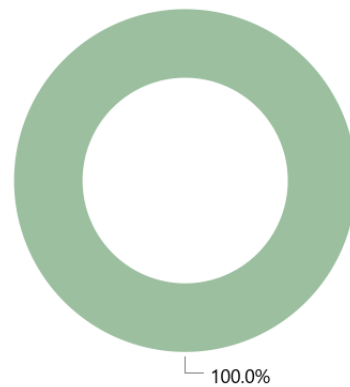
Figure 9 – Northern Gateway Precinct Map



5.2.5 Wianamatta South Creek

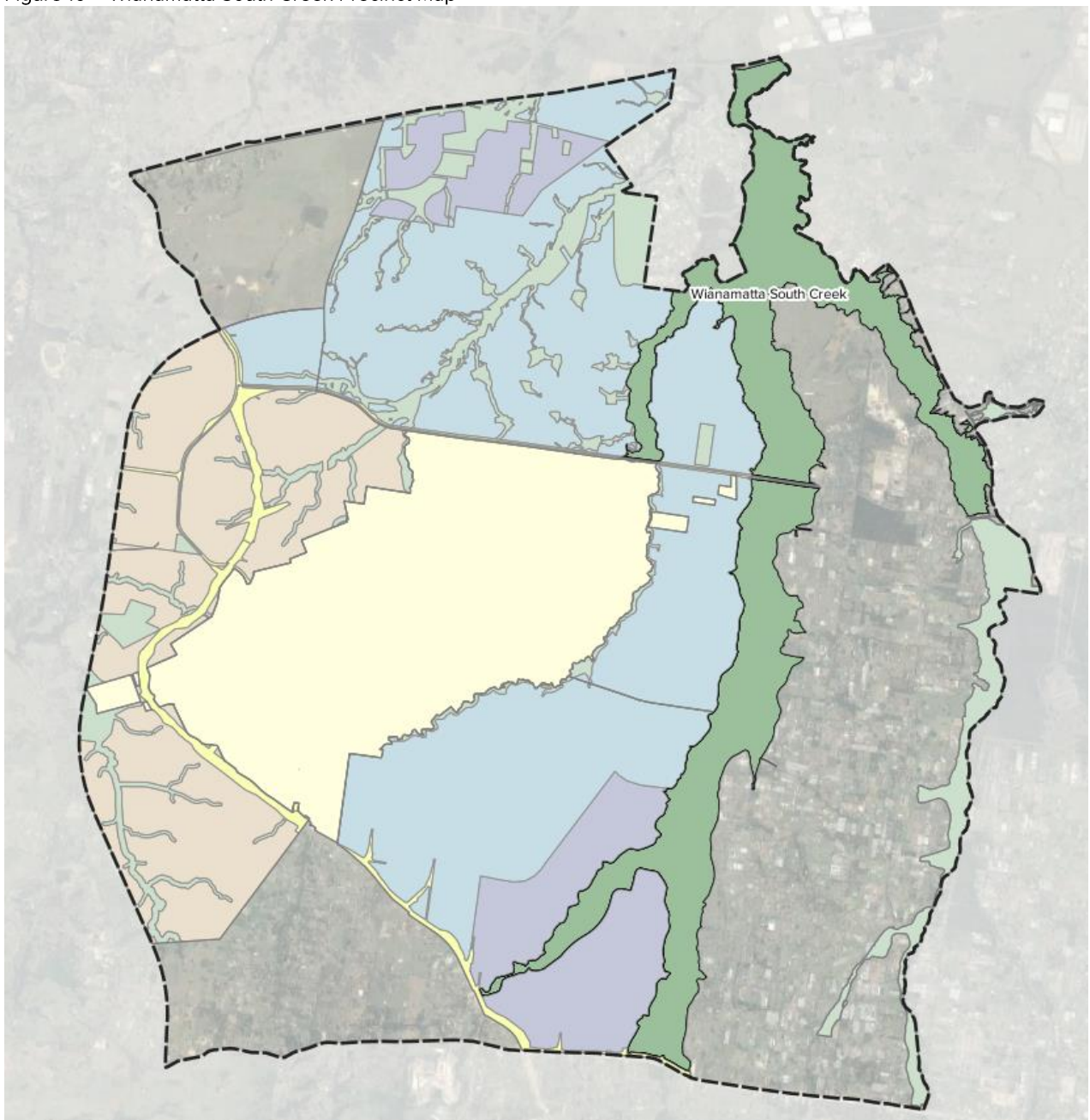
Defined by the approximate extents of the 1 in 100 chance per year flood event, the Wianamatta South Creek Precinct contains vast areas of significant vegetation and is the backbone of the blue green grid in the Aerotropolis.

As the entire precinct falls below the 1 in 100 chance per year flood event, we do not expect there to be any development that would be required to make contributions. It has been assumed that any environmental rehabilitation works and active transport infrastructure will form part of the Special Infrastructure Contribution plan.



Land Use ● ENZ

Figure 10 – Wianamatta South Creek Precinct Map



5.3 Precinct Summary

A breakdown of the land zoning within each precinct is provided in Table 3 below.

Table 3 - Precinct Land Use Summary

Precinct	LGA	Zoning	Area (Ha)
Aerotropolis Core	Liverpool	Enterprise	801.6
		Environment & Recreation	12.0
		Mixed Use	526.6
		Special Purpose 2	41.8
Agribusiness	Liverpool	Agribusiness	960.8
		Environment & Recreation	155.5
		Special Purpose 2	97.0
	Penrith	Agribusiness	220.2
		Enterprise	93.8
		Environment & Recreation	13.9
		Special Purpose 2	17.6
Badgerys Creek	Liverpool	Enterprise	366.6
		Environment & Recreation	18.7
		Special Purpose 2	2.6
	Penrith	Enterprise	209.1
		Environment & Recreation	9.6
		Special Purpose 2	2.3
Northern Gateway	Penrith	Enterprise	1,066.9
		Environment & Recreation	243.4
		Special Purpose 2	16.8
Total			4876.8

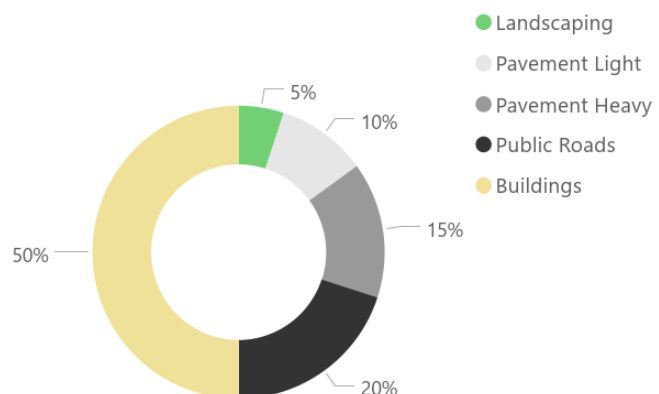
5.4 Development Typologies

In order to calculate the total cost of construction for the anticipated development, each proposed Land Zoning was further broken down into Development Typologies, each with a unique construction profile. These typologies were based on the WSAP and comparisons to surrounding areas.

The construction profiles provide estimates of the required building, pavement (heavy duty), pavement (light duty), public roads and landscaping areas to assist in the cost estimation process. These are shown in the graphs below for each Typology.

5.4.1 Freight and Logistics

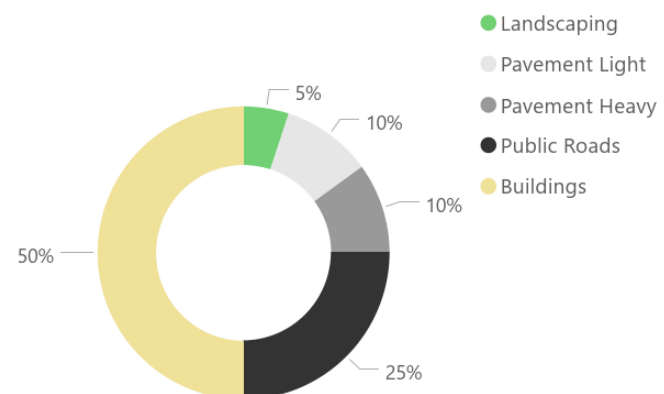
Supporting the movement and transportation of goods across numerous transportation modes (rail, road and air) this typology is made up of very large warehouses and associated carparking with relatively few circulation roads. Similar examples include Oakdale and Erskine Park to the east of the Aerotropolis.



5.4.2 Warehouse & Industrial

This typology is similar to the Freight and Logistics listed above but is based on general industrial uses. It has a smaller average lot size and will accommodate a much wider variety of specific industrial uses.

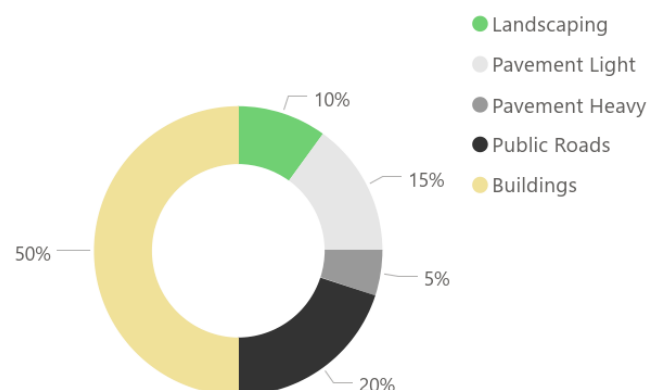
To prevent competition for industrial land, business and retail uses are not expected in these areas.



5.4.3 Retail (Bulky Goods)

This typology is based on retail buildings used primarily for the sale of goods that are such size, shape or weight as to require a large area for handling, display or storage, and/or direct vehicular access to the site of the building or place by members of the public, for the purpose of loading and unloading the items into their vehicle after purchase or hire.

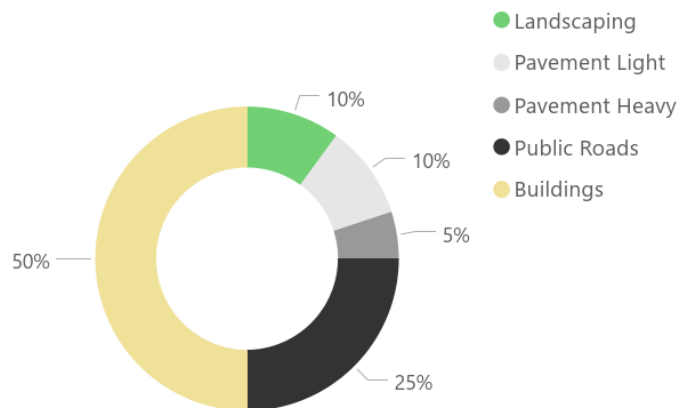
Examples of these goods may be hardware, white goods, baby goods, sporting equipment, etc.



5.4.4 Retail/Commercial

This typology is based on higher grade premises such as a shopping/local centres or high street retail. It anticipates some multi-level retail facilities as well as restaurants and commercial office space.

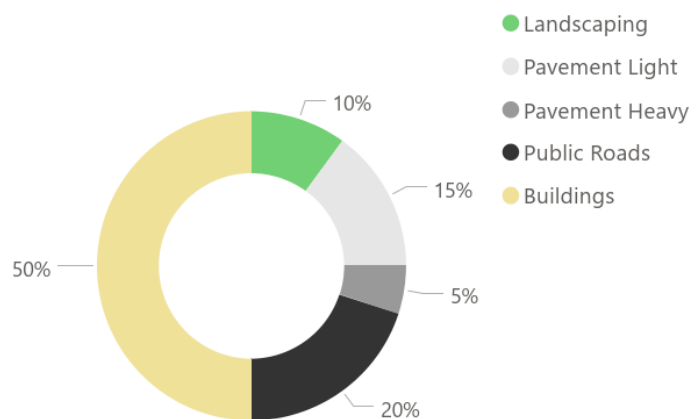
There may be some at grade parking, but some buildings will also have multi-deck parking. Comparable areas would range from local centres through to Liverpool CBD (in the case of the Aerotropolis Core).



5.4.5 Health Services

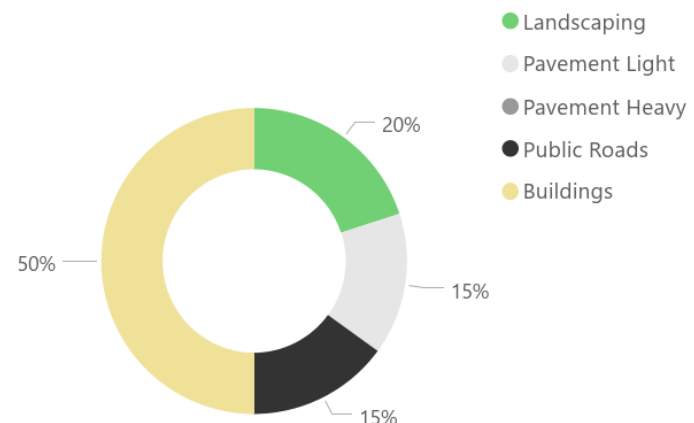
The Health Services typology is primarily based on community health facilities and not hospitals. It anticipates local doctors/GPs, physiotherapists, dentists, etc. Other services may include speech pathology, occupational therapy, counselling.

Similar facilities in Western Sydney include the Penrith and St Clair Community Health Services. Public transport access is a critical requirement of these facilities.



5.4.1 Education

This typology is based on the typical schools (K-12) but with an expectation for some vocational and/or tertiary education facilities (TAFE, universities, etc.). It assumes that any schools would be co-located, or adjacent to open space/sporting fields.



5.4.2 Residential Typologies

In addition to the industrial and commercial building typologies, a similar exercise was undertaken into the likely composition and scale of residential development in the study area to assist in the cost estimation of the works. Population forecasts from the WSAP were used to determine a feasible development mix. This is explained in detail in Section 5.5.1 below.

5.5 Land Use Composition

5.5.1 Residential Uses

Based on the draft SEPP zoning, all new residential development in the Section 7.12 Contributions Plan will be located within the Aerotropolis Core. This excludes development in the Sydney Science Park which, as discussed in Section 4.1 has been excluded from this Plan.

The WSAP indicates that a population of up to 24,000 is expected within the Aerotropolis Core Precinct. The upper range population projections were used to determine an approximate number of dwellings.

Dwelling populations (per household) were determined through a review of population assumptions in various Local Contribution Plans. Six plans from across Western Sydney were reviewed to determine the average household populations for medium density development and apartments.

Table 4 - Household Population Assumptions

Contribution Plan	Medium Density	Apartments			Comment
		1 bed	2 bed	3 bed	
Liverpool City Council Established Areas	3.1	1.8	2.3	3.1	
Edmondson Park	2.4				Up to 38 dw/ha
Showground Precinct	3.0	1.5	2.1	2.6	
Rouse Hill	2.7				Up to 45 dw/ha
Schofields	2.7	1.2	1.9	2.9	
Penrith City Centre	3.1	2.0	2.0	2.0	

Based on the above, the following dwelling population rates were adopted:

Table 5 - Household Population Assumptions

	Medium Density	High Density (low-rise)	High Density (high-rise)
Population per dwelling	3.0	2.4	2.1

The high-density residential developments were based on the Stage 1 LUIIP which stated that:

“Residential densities of 45 to 55 dwellings per hectare will frame the South Creek corridor, increasing to 65 to 80 dwellings per hectare in locations serviced by high frequency public transport”

For the purposes of this report the higher estimates were taken into account, namely low-rise density of 55 dw/Ha & high-rise of 80 dw/Ha.

The medium density development dwelling density was based on a typical R3 zoning with a rate of 32 dwellings per hectare. A summary of the residential development within the Aerotropolis Core is summarised in Table 6.

Table 6 – Residential Development Breakdown Aerotropolis Core

Development Typology	Assumed Dwelling Split	Population per Dwelling	Dwellings per Ha	Area (Ha)	Dwellings	Population
Medium Density Development	50%	3.0	32	125.0	4,000	12,000
Apartments (low rise)	40%	2.4	55	72.7	4,000	9,600

Development Typology	Assumed Dwelling Split	Population per Dwelling	Dwellings per Ha	Area (Ha)	Dwellings	Population
Apartments (high rise)	10%	2.1	80	14.3	1,143	2,400
Total				212.0	9,143	24,000

5.5.2 Employment Uses

The total population/jobs numbers and commentary from the WSAP was used as a guide, along with our review of similar development areas, to estimate the amount of each employment Development Typology in each of the Precincts. These calculations yielded a total number of jobs in the Aerotropolis of 102,127 against the projection of 102,000 in the WSAP which, for the purposes of preparing this CP was considered acceptable.

Table 7 – Development Typologies – Employment Lands

	Aerotropolis Core	Badgerys Creek	Agribusiness	Northern Gateway
Employment Land Use % of Precinct				
Freight and Logistics	24%	85%	85%	80%
Warehouse & Industrial	14%	10%	10%	10%
Retail/Commercial	40%	5%	5%	10%
Education	4%			
Health Services	2%			
Residential	16%			
Area of Each Development Typology by Precinct				
Freight and Logistics	321	489	1,084	854
Warehouse & Industrial	187	58	127	107
Retail/Commercial	531	29	64	107
Education	53	-	-	-
Health Services	26	-	-	-
Total Jobs by Development Typology and Precinct				
Freight and Logistics	5,344	8,155	10,836	14,225
Warehouse & Industrial	6,222	1,919	1,275	3,556
Retail/Commercial	33,207	1,799	3,984	6,668
Education	3,291	-	-	-
Health Services	1,646	-	-	-
Job Totals	49,710	11,873	16,095	24,449
Projected jobs in WSAP	60,000	11,000	10,000	21,000

Table 8 – Percentage of Development Typologies by Land Zoning

Land Zoning	Development Typology	Percentage of Total Area
Agribusiness	Freight and Logistics	85%
	Warehouse & Industrial	10%
	Retail/Commercial	5%
Enterprise	Freight and Logistics	85%
	Warehouse & Industrial	10%
	Retail/Commercial	5%
Industrial	Freight and Logistics	85%
	Warehouse & Industrial	10%
	Retail/Commercial	5%
Mixed Use	Retail / Commercial	15%
	Education	30%
	Health Services	10%
	Warehouse & Industrial	5%
	Medium Density Development	20%
	Apartment Dwellings (Low Rise)	16%
	Apartment Dwellings (High Rise)	4%

The Northern Gateway Enterprise Zoning was an exception to the above, with the areas being amended slightly to allow for the expected additional retail developments along the Elizabeth Drive corridor. Table 9 below shows the Northern Gateway's Development Typology split.

Table 9 - Northern Gateway Enterprise Zone Assumed Development Typologies

Northern Gateway	Development Typology	Assumed Percentage of Total Area
Enterprise	Freight and Logistics	80%
	Warehouse & Industrial	10%
	Retail	10%

Note again, that all residential/mixed use development in the Northern Gateway Precinct is situated in the Sydney Science Park development which is excluded from this Section 7.12 Plan.

5.5.3 Total Land Budgets

The development typologies described above were applied an assumed percentage of the overall area within the precinct. For all Precincts, 15% of the gross area was removed as an allowance for constrained land (flooding, vegetation, heritage, etc.) and transport corridors. The results are summarised in Table 10 below.

Table 10 – Development Typology Land Area by Precinct (Ha)

Land Use	Development Typology	Aerotropolis Core	Badgerys Creek	Agribusiness	Northern Gateway
Enterprise, Agribusiness & Industrial	Freight and Logistics	321	489	1,084	854
	Warehouse	160	58	127	107
	Retail	321	29	64	107
Mixed Use	Warehouse	26			
	Retail	211			
	Education & schools	53			
	Health services	26			
	Medium Density Development	125			
	Apartments (low rise)	73			
	Apartments (high rise)	14			

6 Baseline Assessment of Existing Infrastructure

The existing infrastructure within the study area was reviewed to determine the baseline infrastructure available. This included an inventory of collector roads, open space and community facilities.

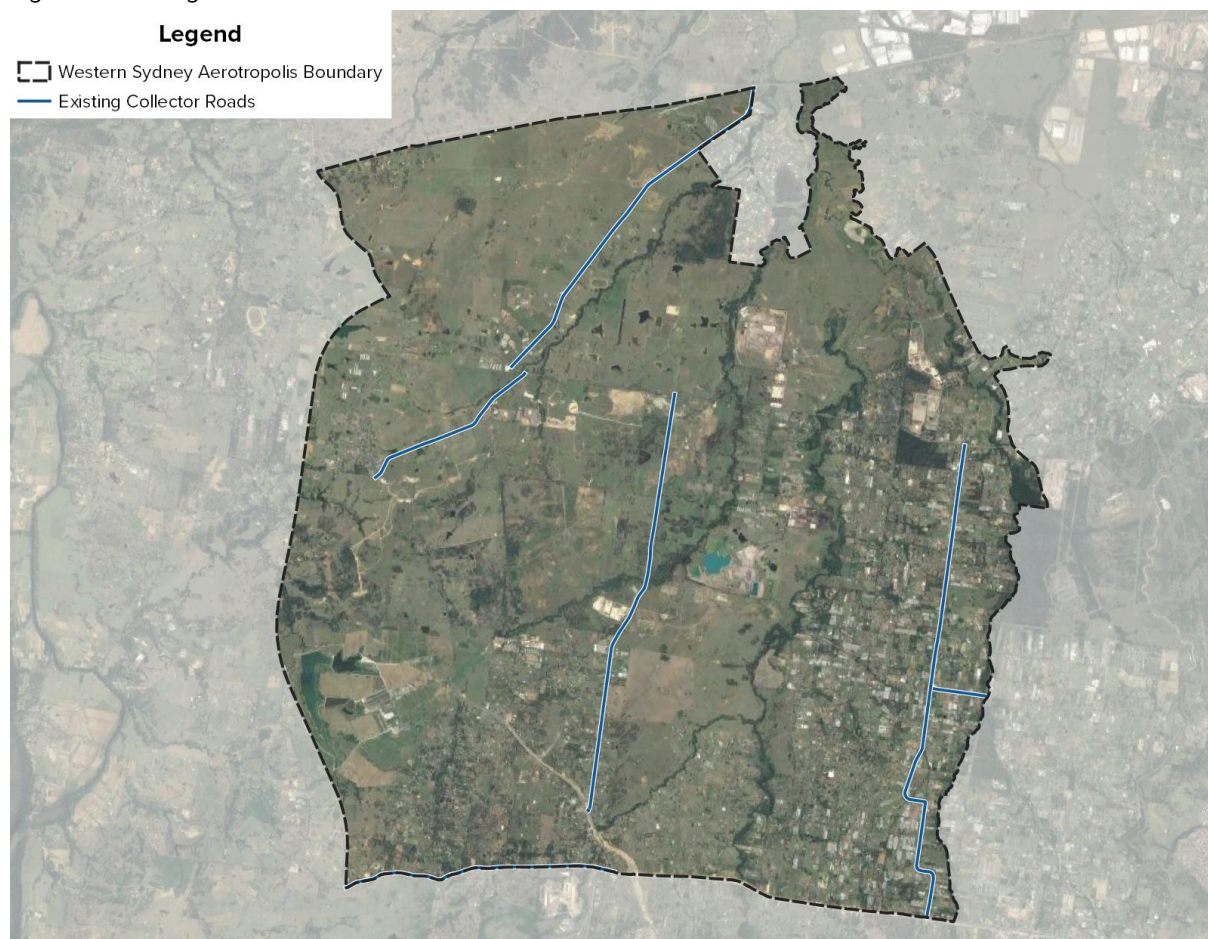
6.1 Roads

Existing collector roads were extracted from NSW Spatial Services GIS data. For the purpose of this assessment it was assumed that roads labelled as “Distributor” be classified as local collector roads.

The collector road within the western side of the Aerotropolis connects Mamre Road in the north to The Northern Road in the south via Elizabeth Drive. The two north-south connections located within the central and eastern parts of the Aerotropolis both connect Elizabeth Drive in the north to Bringelly Road in the south.

The existing collector roads that were considered in the baseline assessment are shown in Figure 11 below. However, the existing rural nature of these roads means that significant realignment, widening and reconstruction works will be required. For the purposes of this assessment we have assumed that these roads will need to be fully reconstructed and no credit should be applied.

Figure 11 - Existing Collector Roads



6.2 Stormwater Drainage

At present there is little to no stormwater drainage infrastructure used for water quantity and quality management purposes within the study area. Existing stormwater infrastructure is largely limited to the pit and pipe network located within the road reserve.

All new detention basins and water quality treatment measures for development within the Study Area will be funded through this Section 7.12 plan.

6.3 Social Infrastructure

A desktop audit was undertaken to determine existing open space, recreation facilities, childcare and community facilities within the subject site and 2km from the border (See Appendix C).

Schools were also audited to assess whether there were any potential opportunities to share open space and/or community facilities with schools as they also grow to meet the demands of the incoming population.

A wider regional audit was also conducted to understand the provision of major regional cultural and recreation facilities, and libraries within 5km and 10km of the Aerotropolis site boundary. A 5km and 10km radius was used because regional/district facilities generally have a larger service catchment (See Appendix C).

Social infrastructure: The only community facility within the site is the Bringelly Community Centre, a refurbished old-style brick building located beside Bringelly Public School.

No major cultural facilities were found to be located within 10km of the site boundaries. While there are 3 libraries within 10km of the site boundaries, these are only branch/district libraries that are already at capacity servicing their own catchments. The regional audit therefore found that the site will not be serviced by existing cultural facilities and libraries.

Open space and recreation: There are currently 5 parks and reserves located within the Aerotropolis site that service the current community. There is potential to embellish these reserves to meet the needs of the incoming population.

The regional audit found that there are no existing recreation facilities within 10km of the site boundaries.

6.3.1 Potential future social infrastructure and open space in surrounding suburbs

A meeting with Liverpool Council's Open Space, Recreation and Community Facilities team was also held to understand future plans for any new facilities and/or upgrades to facilities in the surrounding areas that could also potentially service the Aerotropolis site. While there are significant plans for new district and regional infrastructure, these facilities will not have scope to service the incoming population on the Aerotropolis site, in addition to the projected 70,000 new residents in Austral and have therefore not been included in our analysis.

7 SIC Infrastructure

The *Western Sydney Aerotropolis Plan* outlines the future transport network to link the Aerotropolis with greater Sydney. The proposed road network includes major city and city servicing connections.

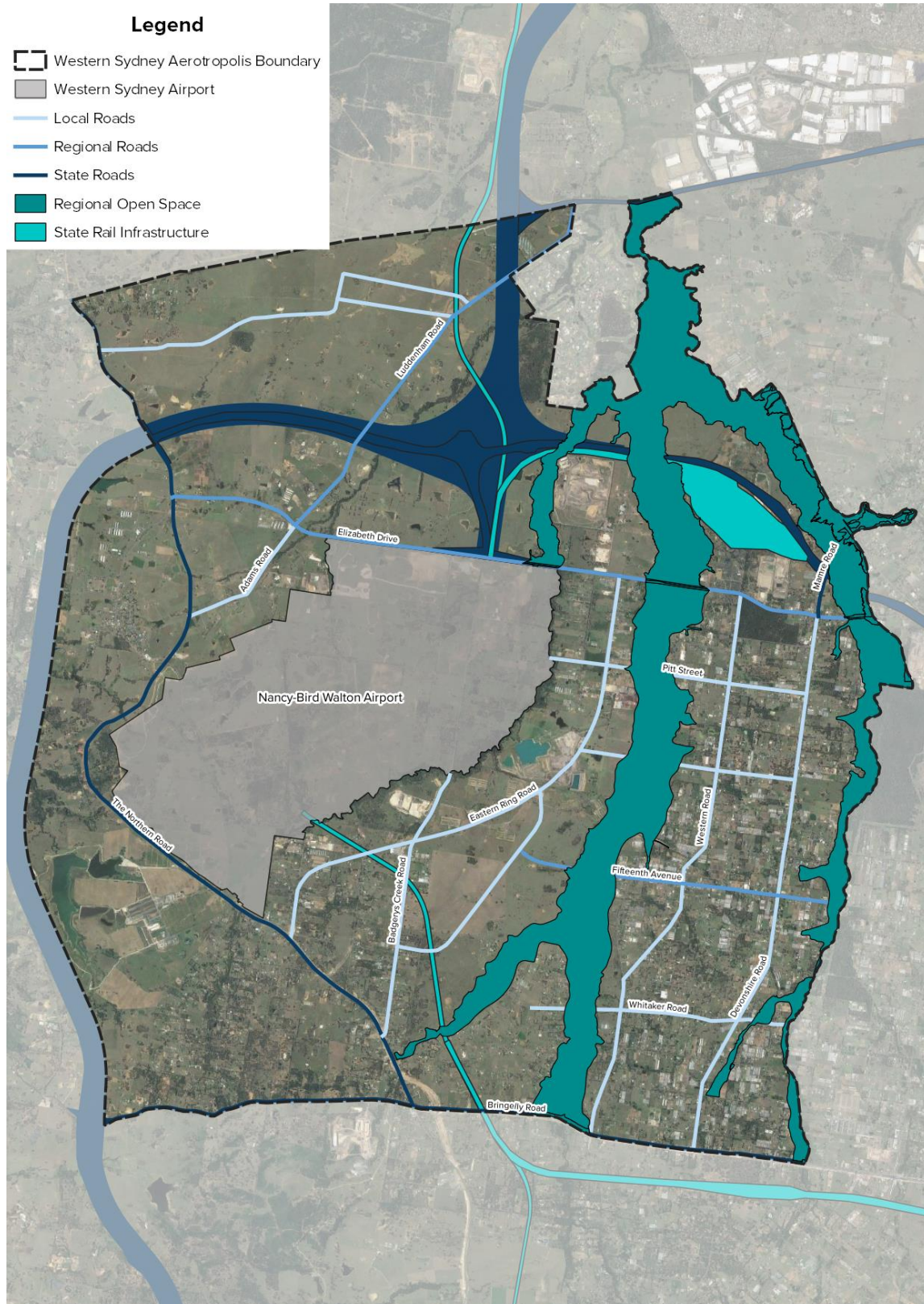
While a Special Infrastructure Contribution (SIC) plan has not yet been prepared for the Aerotropolis precinct, many roads outlined in the WSAP provide a greater regional benefit and are therefore likely to be funded through the SIC or other sources.

In addition, several roads within the Aerotropolis Precinct have received federal funding for upgrade and improvement works. A summary of the proposed roads included in the WSAP is provided in Table 11 below. All of these items have been assumed to be funded via the proposed SIC. Should these roads not be provided as part of the SIC, the Section 7.12 contribution rate may need to be increased.

Table 11 - Aerotropolis SIC Infrastructure

Road Name	Type
Adams Road	Road
Badgerys Creek Road	Road
Bringelly Road	Road
Devonshire Road	Road
Eastern Ring Road	Road
Elizabeth Drive	Road
Fifteenth Avenue	Road
Luddenham Road	Road
Mamre Road	Road
Pitt Street	Road
The Northern Road	Road
Western Road	Road
Whitaker Road	Road
Northern Gateway Road 1	Road
Northern Gateway Road 2	Road
Aerotropolis Core Road	Road
Badgerys Creek Road	Road
M12	Road
Outer Sydney Orbital	Road
East West Rail Link & Stabling Yard	Rail
North South Rail Link	Rail
South West Rail Link Extension	Rail
South Creek Corridor	Open Space

Figure 12 –Assumed SIC Infrastructure



Source: Western Sydney Aerotropolis Plan – NSW Government (December 2019)

9 Identification of Proposed Infrastructure

The following sections outline the approach taken to determine the infrastructure requirements to support the proposed land uses within the Aerotropolis. Although high-level in nature, these have been necessary in advance of the Precinct Planning which is currently progressing.

9.1 Collector Roads

Several recent development sites have been reviewed assist in the preparation of the Section 7.12 plan. A mixture of low density, medium density, mixed use and industrial developments were reviewed to determine the required length of collector roads for each development typology. The development layouts for each site were reviewed to determine the site area and land use mix. Where a development is not yet complete, the master plan was also used to determine the road layout.

Per the existing infrastructure baseline assessment, cadastral information including lot boundaries and road centrelines were extracted from the NSW Spatial Services GIS data. All distributor roads were assumed as collector roads for the purpose of this assessment. In addition, roads labelled as “Local” which front retail, commercial or town centre areas have also been classified as collector roads for this assessment. The developments that were reviewed are summarised in the following sections.

9.1.1 Residential Benchmarking

Four development sites were reviewed to determine the required road infrastructure to support residential uses.

Jordan Springs (Low Density)

The Jordan Springs development is located within the Penrith LGA. The site is 316 hectares in size and will provide a total of 3,620 dwellings. Jordan Springs is zoned “Urban” under the St Marys SREP 30. The objective of the Urban Zone is to ensure development within this area is primarily used for residential purposes and associated facilities. The development has an approximate density of 12 dwellings/Ha and has therefore been considered a low-density residential development for the purpose of this assessment. The average collector road length within the site is 43m/ha.

Figure 13 - Jordan Springs Site



Oran Park (Low Density)

Oran Park is located within the Camden LGA. The site assessed (shown in Figure 14 below) covers an area of 408 hectares and has an average collector road rate of 49m/ha. The majority of land within Oran Park is zoned R1 – General Residential with pockets of R3 Medium Density Residential surrounding the local centre. The development has an approximate density of 9 dwellings/Ha and has therefore been considered a low-density residential development for the purpose of this assessment.

Figure 14 - Oran Park Site



Edmondson Park (Mixed Density)

The Edmondson Park precinct is located within the Liverpool City Council and Campbelltown City Council LGAs and covers the area surrounding the Edmondson Park train station. The precinct was rezoned in May 2008 and is expected to provide up to 6,000 homes.

The Edmondson Park precinct covers an area of 424 hectares with an average dwelling density of 23 dwellings/ha. The site has an average collector road rate of 42m/ha. The Edmondson Park area reviewed as part of this study is shown in Figure 15 below.

Figure 15 - Edmondson Park Site



Tallawong Station Precinct (Mixed Density)

The Tallawong Station Precinct (formerly Area 20 Precinct) is located within the Blacktown City Council LGA and forms part of the North West Growth Area (NWGA). The development is centred around Tallawong Station, located on the new Sydney Metro line. The study area is 233 hectares in size with an approximate dwelling density of 20 dwellings/ha. The Precinct has an average collector road rate of 31m/ha. The area reviewed is shown in Figure 16 below.

Figure 16 - Tallawong Station Site



9.1.2 Industrial & Employment Benchmarking

Four sites were reviewed to determine the required road infrastructure to support mixed use and industrial uses and are explained in more detail below.

Oakdale South (Industrial & Logistics)

The Oakdale South site forms part of the Oakdale Industrial Estate owned by Goodman and located within the Western Sydney Employment Area. The site is zoned IN1 – General Industrial and is used for logistics purposes. The site covers a total area of 117 hectares with an average collector road rate of 32m/ha.

Figure 17 - Oakdale South Benchmarking Site



Erskine Park (Industrial & Logistics)

The Erskine Park precinct is located within the Western Sydney Employment Area. The precinct has been reviewed to determine an appropriate collector road rate for industrial land uses. Many of the sites within the precinct are used for predominantly warehouse and logistics purposes. The Erskine Park precinct has an average collector road rate of 13m/ha.

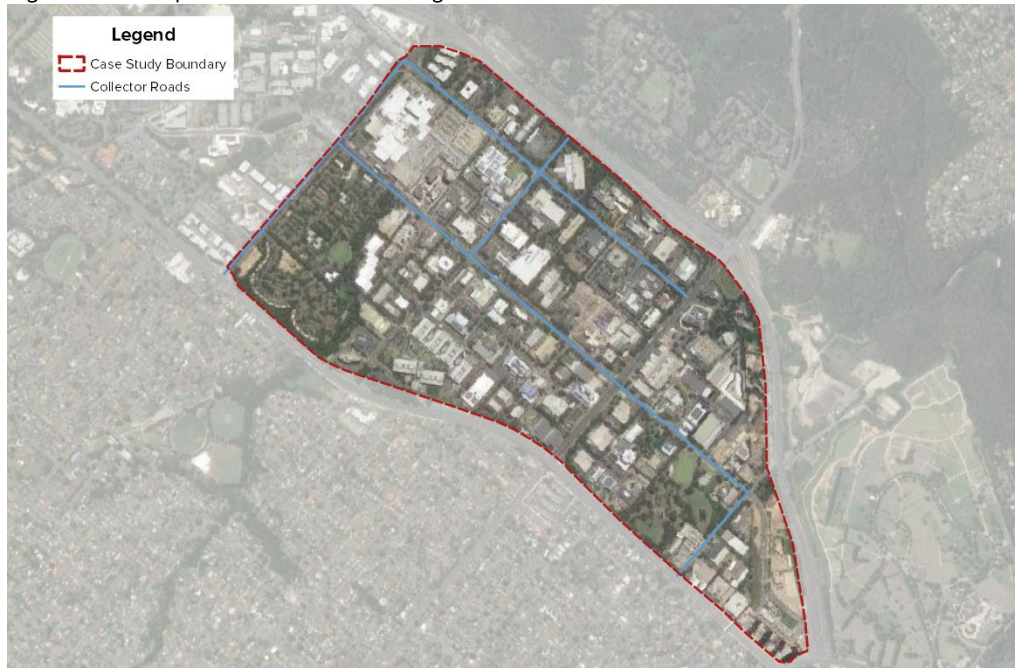
Figure 18 - Erskine Park Benchmarking Site



Macquarie Park (Mixed Use)

The Macquarie Park core area is bound by The M2 Motorway to the north and east, Epping Road to the south and Herring Road to the west. Within this area the predominant land uses include mixed-use and commercial uses. The residential land to the south has been excluded. The Macquarie Park core area has an average collector road rate of 26m/ha.

Figure 19 - Macquarie Park Benchmarking Site



Rydalmere (Mixed Use)

Rydalmere is located 2km north-east of the Parramatta CBD and covers an area of approximately 220 hectares. The majority of the precinct is characterised by industrial and business uses, with low-density housing located in the north. The average collector road rate within Rydalmere is approximately 29m/ha.

Figure 20 – Rydalmere Benchmarking Site



9.1.3 Rates Summary

The collector road provision rates calculated from the above case studies are summarised in the table below. An average rate of provision was calculated for each land use type, which will be applied to the proposed land uses within the Aerotropolis.

Table 12 - Collector Road Rates

Development Type	Development Site	Collector Road Rate (m/Ha)	Adopted Collector Road Rate (m/Ha)	Applicable 7.12 Development Typology
Low/Medium Density	Jordan Springs	43	45	Low Density Development
	Oran Park	49		
Mixed Density	Edmondson Park	42	32	Medium Density Apartments (low rise) Apartments (high rise)
	Tallawong Station	31		
Industrial/Logistics	Oakdale South	20	16	Freight & Logistics Warehouse
	Erskine Park	13		
Mixed Use	Macquarie Park	26	27	Retail Education & Schools Health Services
	Rydalmere	29		

9.1.4 Quantities

The rates summarised in Table 12 were applied to the proposed land uses for the Aerotropolis S7.12 Plan Area to determine the required quantum of collector roads for each precinct.

The results are summarised in Table 13 below.

Table 13 – Required Infrastructure – Collector Roads

Precinct	Total Area (Ha)	Total Length (m)
Aerotropolis Core	35.8	26,673
Agribusiness	29.2	15,243
Badgerys Creek	10.6	8,098
Northern Gateway	29.4	15,507
Total	105.0	65,521

9.2 Stormwater

Existing Local Contribution Plans have been reviewed to determine the required provision of new regional stormwater detention and water quality management infrastructure.

9.2.1 Examples

Four local contributions plans were reviewed to determine the average land take requirements for both detention and water quality infrastructure. The total provision of detention basins and water quality management infrastructure was used to determine a rate per Net Developable Area (NDA) required for new development. These rates will be applied to development within the Aerotropolis S7.12 Plan Area.

For the purpose of this assessment, the highest and lowest values have been excluded, and an average has been taken of the remaining five values to provide a conservative estimate. The results are provided in Table 14.

Table 14 – Stormwater Infrastructure Rates

Contribution Plan	Oran Park & Turner Road		Austral & Leppington North	East Leppington	Riverstone East & Rouse Hill		
	South Creek	Cobbity Creek			First Ponds Creek	Killarney Chain of Ponds	Second Ponds Creek
Contributing Catchment (NDA)	389.57	181.72	1,131	75.59	240.5	105.3	104.6
Detention Area (m²)	82,100	47,800	252,168	3,285	95,150	41,250	
Detention %	2.1%	2.6%	2.2%	0.4%	4.0%	3.9%	
WQ Area (m²)	61,300	14,100	823,104	28,341	17,879	16,300	16,385
WQ %	1.6%	0.8%	7.3%	3.7%	0.7%	1.5%	1.6%

Based on the above, the following rates were adopted for both residential and employment land uses:

- Detention infrastructure – 2.7% of Net Developable Area
- Water Quality infrastructure – 1.8% of Net Developable Area

9.2.2 Quantities

The rates outlined above were applied to the proposed land uses for the Aerotropolis S7.12 Plan Area to determine the required quantum of stormwater management infrastructure.

For the purpose of this assessment it has been assumed that the NDA is equal to 85% of the gross area which assumes 15% of the site is constrained land (e.g. flooding, vegetation, transport corridors, heritage, etc). The results are shown in Table 15.

Table 15 – Required Infrastructure – Stormwater

Precinct	Development Typology	Net Developable Area (Ha)	Stormwater Detention (m ³)	Water Quality (m ²)
Aerotropolis Core	Freight & Logistics	273	73,591	49,061
	Warehouse	159	42,839	28,559
	Retail	452	121,936	81,291
	Education & Schools	45	12,086	8,057
	Health Services	22	6,043	4,029
	Medium Density Development	90	24,328	16,219
	Apartments (low rise)	72	19,463	12,975
	Apartments (high rise)	18	4,866	3,244
Agribusiness	Freight & Logistics	921	248,685	165,790
	Warehouse	108	29,257	19,505
	Retail	54	14,629	9,752
Badgerys Creek	Freight & Logistics	416	112,294	74,862
	Warehouse	49	13,211	8,807
	Retail	24	6,606	4,404
Northern Gateway	Freight & Logistics	725	195,879	130,586
	Warehouse	91	24,485	16,323
	Retail	91	24,485	16,323
Total		3,610	974,683	649,787

9.3 Social Infrastructure

The purpose of this analysis is to inform the Western Sydney Aerotropolis Development Contributions Plan (Section 7.12) for Liverpool City Council and Penrith City Council.

Adequate provision of social infrastructure and open space is critical to building strong and resilient communities. As a greenfield site, the Aerotropolis presents an opportunity to deliver adequate and best practice provision of social infrastructure and open space that supports the needs of future residents. Our approach to assessing future community need is summarised below:

9.3.1 Consideration of Best Practice Approaches to Social Infrastructure and Open Space Delivery

In addition to benchmarking, it is also important to consider current best practice to social infrastructure and open space delivery. Key best practice approaches to social infrastructure, including principles for delivery, are summarised below.

Social Infrastructure

- **Multi-purpose rather than single purpose:** best practice is to provide facilities that combine a range of uses in the one building (e.g. childcare, library and community hall, and indoor courts combined). This results in larger, centralised facilities rather than small and dispersed.
- This approach aligns with Liverpool City Council's policy to not support new single purpose and small community facilities, with a preference for larger multipurpose centres of around 1,000m² that service a suburb or multiple suburbs.
- Benchmarking for social infrastructure in Penrith City Council will be an outcome of the Community Cultural Facility Needs Study being completed in 2020.
- **Accessible and co-located:** Social infrastructure should be located in central locations, co-located with other compatible land uses such as shops, services or schools, meet universal design standards and be accessible via public and active transport. Community facilities and libraries located in town centres are proven to stimulate social and economic activity.
- **Networked:** Community facilities should function as part of a network of facilities that together meet community needs. A hierarchy of facilities exists including higher order facilities (such as a regional or district community hub) that service the whole of community, vs local facilities that meet day to day needs.

Open Space and Recreation

When planning for open space in greenfield sites the opportunity exists to provide a network of well-located and accessible parks. While at this stage the future density of Aerotropolis is not confirmed, good planning of the open space network early can result in a more efficient use of land while also meeting the performance outcomes for open space recreation. The following considerations apply to meet future community needs:

Distribution: Distribution or proximity benchmarks can assess the geographic distribution and accessibility of open space: how far from home, work, or school do people need to travel to access open space?

The following targets are applied to residential areas:

- All residents can walk to a park of at least 0.3ha within 400m
- All residents living in high density can walk to a park within 200m of at least 0.1ha

Quantity: The standard benchmark of 2.83ha/1000 people has been applied to determine quantum of open space.

The following benchmarks have also been applied as per the Government Architect Greener Places (specifically for greenfield sites):

- Major/destination parks: 1:20,000 people
- District parks (2-5ha): 1:5,000 people
- Local parks (0.3 - 2ha) 1:2,500 people

Quality: The quality of open space is key to its usability and attractiveness. Quality indicators can include for example amenity (e.g. maintenance, noise, facilities and equipment, aesthetics); access (visual and physical access, disability access); safety; size, shape and topography; vegetation and setting. A large amount of poor-quality open space may not meet a community's needs as well as a smaller, high quality provision.

Benchmarking for recreation facilities helps to ensure useable, quality open spaces are delivered for the future community. See Appendix A for benchmarks applied for this needs analysis.

It's also important that open space design is inclusive and apply the NSW *Government Everyone Can Play* principles of 'Can I get there? Can I play? Can I stay?' With the provision of accessible paths, adequate and large sheltered areas, accessible amenities blocks and toilets, appropriate lighting, planting and shade for a cool and comfortable park experience. This higher standard may have impact on embellishment rates.

Diversity: The range of open space types within an area determines that diversity of recreation opportunities for a community. Co-locating different uses in one space can support activation and create a space for the whole community to come together. Benchmarking can look at the number of different types of recreation opportunities available in an area.

Hierarchy and size: Hierarchy approaches recognise that not all parcels of open space can or should be the same level of development and is a useful approach to ensure different needs (e.g. for local community space vs major regional space) are met efficiently. Generally, public open space is classified into some form of a local, district and regional hierarchy, based on size and uses. The hierarchy proposed aligns with NSW planning guidelines.

Climate and local characteristics: When planning for open space in the context of Western Sydney it's also important to consider the increased heat that this area experiences, resulting in a greater need for further embellishments such as shading, use of natural materials (such as timber and mulch) for exercise and play equipment where possible, and water play to enable continued enjoyment of parks and opens spaces across the Summer.

9.3.2 Recommendations

Recommendations have been organised according to Council area, based on the Aerotropolis precincts. Table 16 summarises the identified social infrastructure needs for the residential population in the Aerotropolis Core. Table 17 and Table 18 summarise the identified open space and recreation needs for the Aerotropolis Core.

Size assumptions for spaces within/adjoining facilities have been based on precedent case studies.

Table 16 - Social Infrastructure Needs (Aerotropolis Core)

Facility	Facility Size (m ²)	Land Size	Location
District Multi-Purpose Community Hub with the following features:	Facility total: 2,260m ² Adjoining civic open space: 1,000m ²	0.8 ha	Aerotropolis Core. Located within the town centre located with other services such as shops and schools.
Library floorspace	1,008		
Multi-purpose community hall space (capable of also being used for district performance & rehearsal space)	528		
Flexible meeting space	100		
Cultural production space (small scale e.g. tech or pottery)	100		
Community kitchen	150		
Subsidised office space x 4 offices & hot desks	150		
Foyer, lounge and cafe	300		
Recording studio spaces	80		
Connected outdoor, public civic space	1000		
High quality child space council owned and managed Early childhood education and care centre	1,350 (indoor and outdoor spaces)	0.3 ha	As above.

Table 17 – Quantity Benchmark Requirements for Open Space & Recreation (Aerotropolis Core)

Hierarchy/Facility	Size	Quantity	Total Land Required
Number of Parks (Government Architect NSW – specifically for greenfield sites)			
Local Parks	Average size > 0.5ha	11	Approx. 5ha Assume that 100% of local is in urban areas
District Parks	Average size > 5ha	5	Approx. 25ha Assume 40% urban, 60% sport and recreation green grid corridor zones
Major Destination Parks	Minimum size 20ha	1	Up to 20ha Assume 100% South Creek corridor
Sport and Recreation Facilities (Office of Sport/Growth Centres Commission/Parks and Leisure Australia)			
District sports grounds	10ha	2	20ha
Multi-purpose outdoor courts	Approx. 0.05ha per court + runoff space and amenities	6	0.3ha
Play space	100m ² minimum within a park	12	N/A
Outdoor fitness stations	Varies - could be provided as multiple nodes along a recreation trail or one larger facility	2	N/A
Youth Precinct	Approx. 1,000m ²	1	0.1ha
Water Play	Scale can vary	6	N/A

Table 18 – Pools and Leisure (Aerotropolis Core)

Facility	Facility Size (m ²)	Land Size	Location
Indoor Leisure Centre with the following features:	Facility total: 3,000m ²	Land size should be large enough to accommodate future expansion of the facility (and courts) if required.	Aerotropolis Core. Located on the edge of the South Creek Corridor to reinforce the recreation corridor.
1 x learn to swim/hydrotherapy indoor pool	500		
1 x 25m indoor pool	500		
2 x indoor courts	750		
Shower/changerooms	200		
Community meeting rooms	150		
Youth recreation hang out space	200		
Foyer, lounge and cafe	400		
1 x outdoor toddler pool	300		
1 x outdoor 50m pool	700		
Adjoining open space/picnic area	1,000		

In addition to the above, social and recreational infrastructure will be provided for the working population across the Aerotropolis Growth Area. For the purpose of this Section 7.12 Plan, it has been assumed that additional open space and childcare will be required to support this population.

The demand for social infrastructure generated by the working population is based on the rates outlined in the City of Sydney Development Contributions Plan 2015. In this plan, the following assumptions were adopted based on survey data:

- One worker generates demand for open space equivalent to 0.2 residents
- One worker generates demand for childcare equivalent to 0.6 residents

It has been assumed that the working population within the Aerotropolis Core Precinct can be suitably serviced by the proposed infrastructure listed above.

Table 19 – Social, Open Space & Recreation Infrastructure Needs (Working Population)

Facility	Number of Parks/Facility Size	Land Size (Ha)	Location
Local Park	4	2	To be confirmed during the Precinct Planning phase
District Park	2	10	
Major Destination Park	1	20	
High quality, 118 space council owned and managed early childhood education and care centre	1,769m ² (indoor and outdoor spaces)	0.4	

9.4 Riparian Corridors

The Section 7.12 Plan includes an allowance for land acquisition for roads, drainage and social infrastructure. In addition to the infrastructure listed above, it has been assumed that Penrith and Liverpool City Councils will acquire all riparian corridors for third and fourth order creeks. It has been assumed that first and second order creeks will be managed by developers.

The total riparian corridor area to be acquired in each Precinct was taken from geospatial data available from NSW Spatial Data Services and is summarised in Table 20 below. The Riparian corridors within the Wianamatta South Creek Precinct was excluded from these numbers and is assumed to be contained in a future SIC.

Table 20 - Riparian Corridor Area for Acquisition

Precinct	3 rd and 4 th Order Riparian Corridor Area (m ²)
Aerotropolis Core	505,254
Badgerys Creek	180,571
Agribusiness	76,275
Northern Gateway	6,547
Total	768,647

10 Cost Estimates

10.1 Cost Rates

10.1.1 Collector Roads

It is anticipated that all new collector roads will be constructed in accordance with the *Western Sydney Street Design Guidelines*, prepared by the Western Sydney Planning Partnership. For the purpose of this assessment it has been assumed that the roads included in the S7.12 Plan will adopt the “Local Collector”, “High Street” and “Industrial Street” typologies.

Table 21 – Street Types

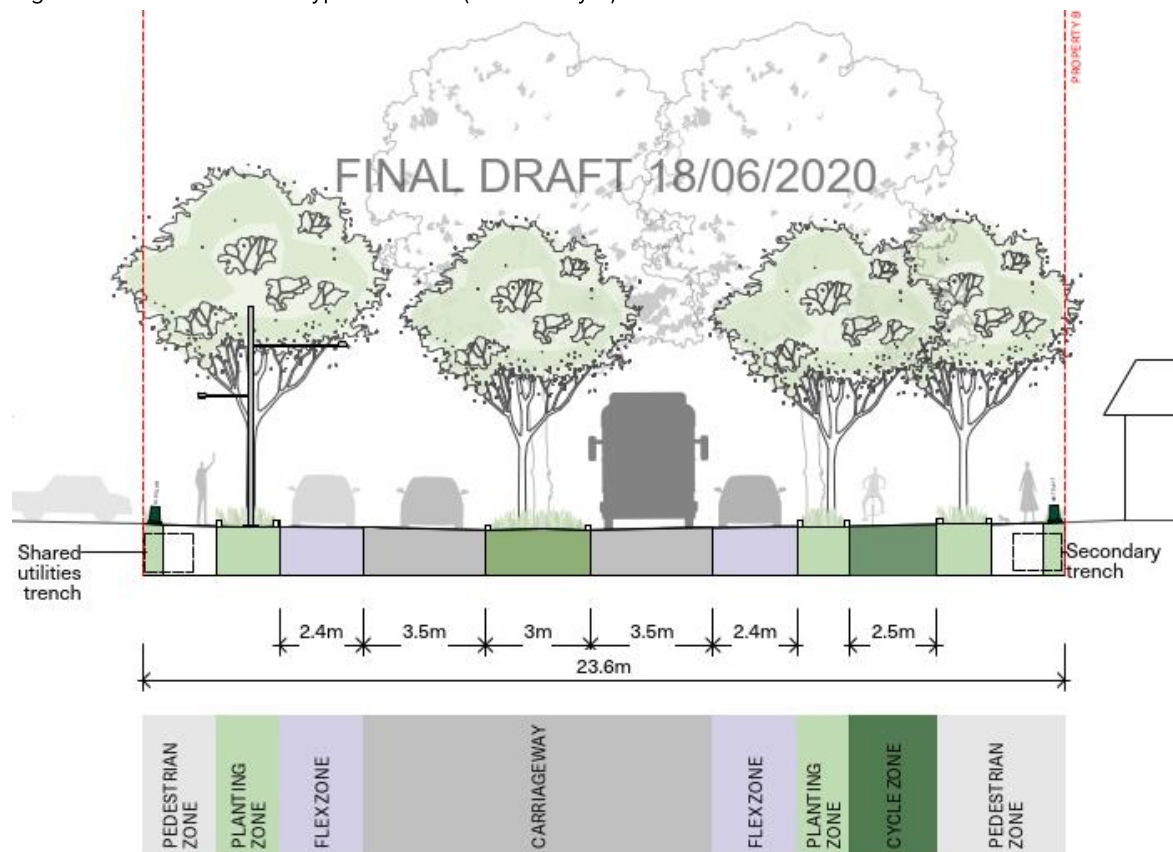
Street Type & Description	Nominal Corridor Width	Indicative Traffic Volume (VPD)
Local Collector Slow speed streets to and through neighbourhoods.	23-24m	3,000 – 6,000
High Street Unique to commercial centres where ground floor building uses require high quality public domain amenity and generous verge space for street activities.	20m	≤ 3,000
Industrial Street Higher-order neighbourhood streets that typically facilitate the connection of the arterial road network to local street networks.	22-23m	3,000 – 6,000

Source: Western Sydney Street Design Guidelines – Western Sydney Planning Partnership (2019)

It should be noted that the *Western Sydney Street Design Guidelines* also include typical sections for local streets, laneways and sub-arterial roads. These road typologies have not been included as they are assumed to fall outside the scope of the S7.12 plan. Sub-arterial roads are assumed to be included in the Special Infrastructure Contributions Plan, and lower order roads will be provided by developers at their own cost in accordance with current practice.

Typical sections for the assumed road typologies are provided below. Cost rates for collector roads were determined using contractor rates provided to IDC on past projects. A summary of the cost rates is provided in the following tables. Costs are provided on a per metre basis. It should be noted that the cost rates do not include an allowance for contingency.

Figure 21 – Local Collector Typical Section (Case Study B)

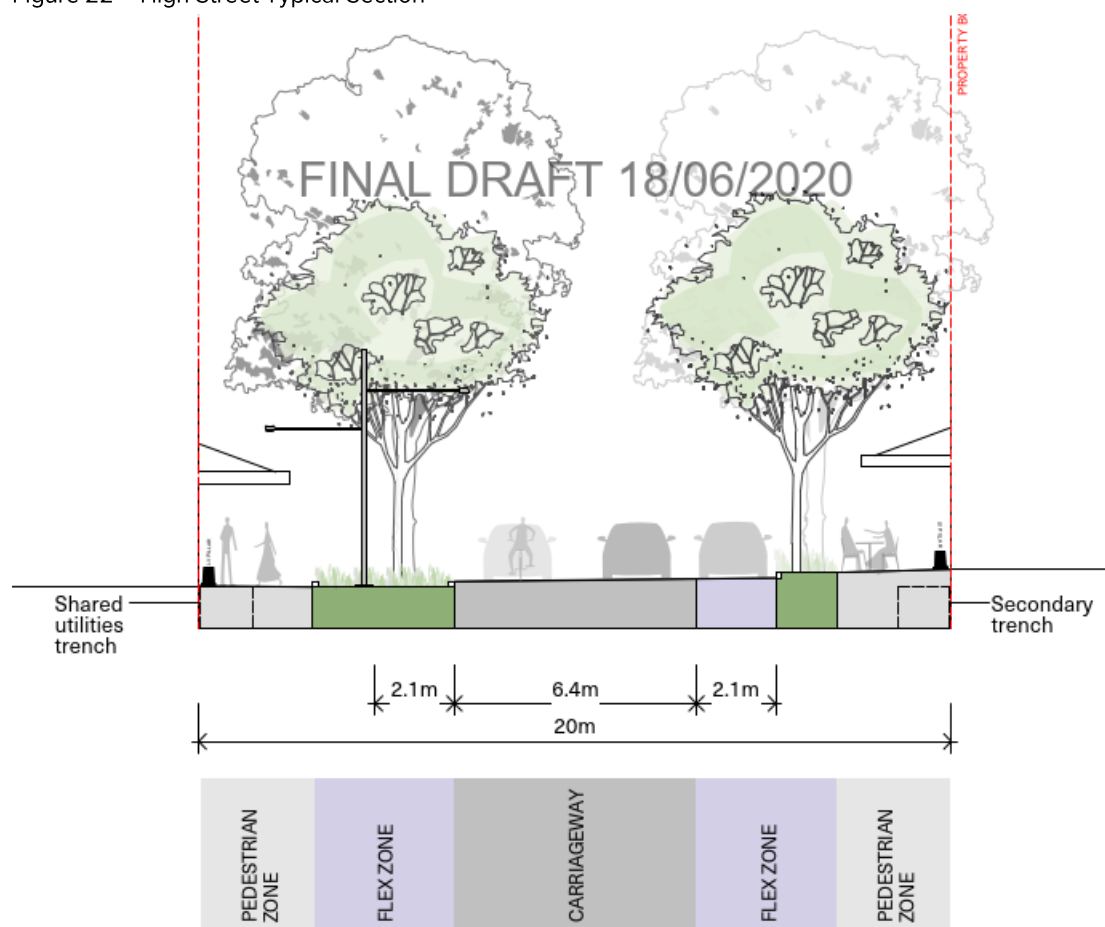


Source: Western Sydney Street Design Guidelines – Western Sydney Planning Partnership (2019)

Table 22 – Local Collector Cost Rate

Item	Rate (\$/m)
Earthworks	\$11.80
Traffic Lanes	\$703.70
Flex Zone (landscaping/parking)	\$280.80
Utilities & Stormwater	\$1,310.00
Verge & Landscaping	\$1,203.15
Total	\$3,510.00

Figure 22 – High Street Typical Section



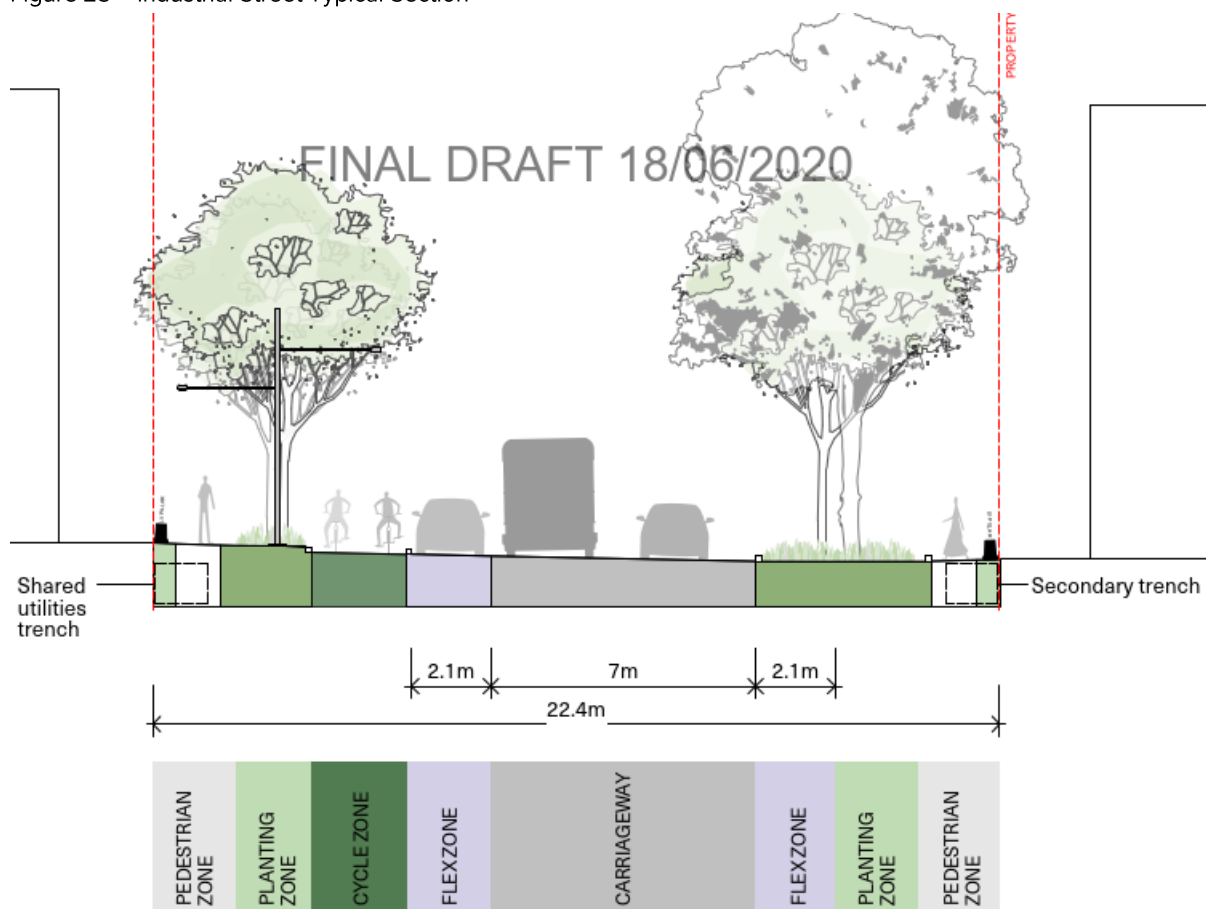
Source:

Western Sydney Street Design Guidelines – Western Sydney Planning Partnership (2019)

Table 23 – High Street Cost Rate

Item	Rate (\$/m)
Earthworks	\$10.00
Traffic Lanes	\$662.30
Flex Zone (landscaping/parking)	\$267.75
Utilities & Stormwater	\$1,310.00
Verge & Landscaping	\$1,351.50
Total	\$3,600.00

Figure 23 – Industrial Street Typical Section



Source: Western Sydney Street Design Guidelines – Western Sydney Planning Partnership (2019)

Table 24 – Industrial Street Cost Rate

Item	Rate (\$/m)
Earthworks	\$11.20
Traffic Lanes	\$1,131.65
Flex Zone (landscaping/parking)	\$245.70
Utilities & Stormwater	\$1,310.00
Verge & Landscaping	\$1,098.35
Total	\$3,800.00

It has been assumed that all collector roads within residential areas will be in the “Local Collector” typology and all collector roads within freight and logistics, warehousing, service and other industrial and agribusiness will be of the “Industrial Street” typology. Within retail, health services and school areas it has been assumed that 50% of collector roads will be of the “High Street” typology and 50% will be of the “Local Collector” typology.

Table 25 – Collector Road Cost Rates

Road Type	Cost Rate	Applicable Development Typologies
Local Collector	\$3,510/m	Residential, retail, health services, schools
High Street	\$3,600/m	Retail, health services. Schools

Road Type	Cost Rate	Applicable Development Typologies
Industrial Street	\$3,800/m	Freight and logistics, warehouse, service and other industrial, agribusiness

10.1.2 Stormwater Drainage

Stormwater drainage cost rates were extracted from the *Assessment of Revised Section 94 Contributions Plan No 21 – Marsden Park* prepared by IPART in 2017. The IPART assessment provided a comparison of detention basin cost rates across various local contribution plans. The results are summarised in Table 26 below.

As per the calculation of stormwater provision rates outlined in Section 9.2, the highest and lowest values have been excluded and an average has been calculated for the remaining rates. The result was then adjusted for inflation using the CPI data from the Australian Bureau of Statistics.

Table 26 - Comparison of per cubic metre basin cost estimates and size (\$June 2016)

Contribution Plan	Basin Volume Total (m ³)	Basin Cost Total (\$M)	Number of Basins	Average Basin Volume (m ³)	Average Basin Cost (\$/m ³)
CP21 (BCC)	634,618	131.8	20	31,731	208
CP21 (JWP)	596,795	50.8	20	29,840	85
CP20 (BCC)	563,706	143.4	35	16,106	254
CP24 (BCC)	93,998	17.4	11	8,545	185
CP15 (THSC)	436,000	36.5	9	48,444	84
CP16 (THSC)	183,700	18.9	6	30,617	103
Austral & Leppington North (Camden & Liverpool)	332,310	37.2	27	12,308	112

Source: Assessment of Revised Section 94 Contributions Plan No 21 – Marsden Park - IPART (2017)

This process was also undertaken for raingarden costs. The results of the IPART assessment are summarised in Table 27.

Table 27 - Raingarden cost comparison of existing contribution plans (\$June 2016)

Contribution Plan	Total Raingarden Area (m ²)	Cost Total (\$M)	Number of Raingardens	Average Raingarden Area (m ²)	Average Raingarden Cost (\$/m ²)
CP21 (BCC)	9,900	7.4	8	1,23	752
CP21 (JWP)	10,340	5.6	8	1,239	545
CP20 (BCC)	79,420	37.6	34	2,336	473
CP24 (BCC)	3,250	5.5	7	464	1,704
CP15 (THSC)	17,200	6.6	9	1,911	384
CP16 (THSC)	14,480	6.5	13	1,114	450
Austral & Leppington North (Camden & Liverpool)	N/A	N/A	N/A	1,200	262

Source: Assessment of Revised Section 94 Contributions Plan No 21 – Marsden Park - IPART (2017)

Based on the above, the following cost rates were adopted:

- Detention Basins \$130/m³
- Raingardens \$550/m²

It should be noted that the above costs include works only. Land acquisition costs have been excluded due to the variable nature of land value across Western Sydney.

10.1.3 Social Infrastructure

Social infrastructure cost rates were provided by Penrith City Council. Where rates were unavailable, rates from previous projects undertaken by Cred were adopted.

Table 28 - Social Infrastructure Cost Rates

Facility	Base Building Rate (\$/m ²)	Fit out Rate (\$/m ²)	Source
District Multi-Purpose Community Hub & Library			
Library floorspace (m ² /person)	\$3,250	\$2,500	Cred
Multi-purpose community hall space (m ² /person)	\$2,500	\$3,000	Cred
Flexible meeting space	\$3,000	\$2,250	Cred
Cultural production space (small scale e.g. tech or pottery)	\$2,500	\$1,850	Cred
Community kitchen	\$2,880	\$1,850	Cred
Subsidised office space x 4 offices & hot desks	\$1,790	\$980	Cred
Foyer, lounge & café	\$2,200	\$1,350	Cred
Recording studio spaces	\$2,060	\$1,490	Cred
Connected outdoor, public civil space	\$2,500	\$1,850	Cred
High quality, council owned and managed early childhood education and care centre	\$2,200	\$1,200	Cred
Parks			
Local park (rate per ha)	\$1,000,000		Council
District park (rate ha)	\$1,200,000		Council
Major destination park/city wide park (rate ha)	\$1,200,000		Council
District sports grounds (2 double playing fields and amenities) (rate per ha)	\$3,000,000	\$80,000	Council
Multi-purpose outdoor courts (rate per ha)	\$1,200,000	\$1,600,000	Council
Play space (assumed located within a park) (rate per play space)	\$600,000		Council
Outdoor fitness stations (rate per station)	\$120,000		Council
Youth precinct	\$4,000	\$4,500	Council
Water play (provided in district park)	\$800,000		Council
Indoor Leisure Centre			
Outdoor toddler pool	\$3,700	\$550	Council
Outdoor 50m pool (8 lanes)	\$3,700	\$550	Cred
Shower/changeroom block	\$2,000	\$900	Cred
Adjoining open space/picnic area	\$1,000	\$1,850	Council
Learn to swim/hydrotherapy indoor pool	\$3,500	\$1,550	Cred
25m indoor pool	\$3,500	\$1,500	Cred
2x indoor courts	\$2,480	\$1,480	Cred
Community meeting rooms	\$3,000	\$2,250	Cred
Youth recreation hang out space	\$2,200	\$1,350	Cred
Foyer, lounge & café	\$2,200	\$1,350	Cred

10.1.4 Land Acquisition

Land acquisition rates have been provided by Atlas Urban Economics. The rates adopted for this Section 7.12 Plan are summarised in Table 29.

For the purpose of this assessment, it has been assumed that all road infrastructure will be located within developable land. Stormwater infrastructure is assumed to be located in both developable and constrained land at a 50/50 split. Riparian corridors are assumed to be located within constrained land and will therefore be acquired at the constrained land acquisition rate.

Composite acquisition rates have been developed for social and recreation infrastructure. It has been assumed that all passive open space (across all precincts) will be located within constrained land. Acquisition rates for active open space and social infrastructure have been estimated based on an assumed mix of developable and constrained land.

Table 29 - Land Acquisition Rates

Development Typology	Land Type	Acquisition Rate (\$/m ²)
Freight & Logistics and Warehouse	Developable	\$400.00
	Constrained	\$85.00
Retail (Bulky Goods)	Developable	\$500.00
	Constrained	\$85.00
Retail/Commercial	Developable	\$2,000.00
	Constrained	\$85.00
Education and Health Services	Developable	\$200.00
	Constrained	\$85.00
Medium Density Residential	Developable	\$800.00
	Constrained	\$85.00
Apartments (Low Rise)	Developable	\$1,500.00
	Constrained	\$85.00
Apartments (High Rise)	Developable	\$2,000.00
	Constrained	\$85.00
All Land Uses	Passive Open Space	\$85.00
	Active Open Space	\$400.00
	Social Infrastructure	\$400.00

10.2 Development Costs

The anticipated development cost for both residential and employment land uses has been calculated for all precincts within the Aerotropolis. The methodology for calculating the total development cost is outlined in the following sections.

10.2.1 Site & Cost Rate Assumptions

Development costs were determined by first developing a typical site area breakdown. For employment development typologies, each site was split into hardstand, landscape, roads & drainage, and developable area. These assumptions are summarised in Table 30.

In addition to the above, it has been assumed that site utilisation equates to 85% of the total area. The remaining 15% of the site is assumed to be constrained and cannot be developed. Constrained land includes flood prone land, riparian corridors, heritage items and transport corridors.

For residential development typologies it was assumed that 25% of the site will be required for roads and drainage infrastructure. 10% of the total site area is assumed to be constrained. Costs for hardstand and landscaped areas are assumed to be included in building costs, which forms the balance of the site area.

Table 30 – Typical Employment Site Area Breakdown

Development Typology	Site Coverage	Hardstand (Light)	Hardstand (Heavy)	Landscape	Roads & Drainage
Freight and Logistics	50%	10%	15%	5%	20%
Warehousing	50%	10%	10%	5%	25%
Retail, business premises	50%	15%	5%	10%	20%
Education & schools	50%	15%	0%	20%	15%
Health services	50%	15%	5%	10%	20%

Hardstand areas have been separated into light and heavy to account for varying pavement thicknesses.

The following cost rates were assumed for each development typology.

Table 31 – Assumed Building Cost Rates

Development Typology	Hardstand (Light) (\$/m ²)	Hardstand (Heavy) (\$/m ²)	Landscape (\$/m ²)	Roads & Drainage (\$/m ²)	Building Cost (\$/m ² GFA)
Freight and Logistics	\$150	\$300	\$50	\$100	\$1,100
Warehousing	\$150	\$300	\$50	\$100	\$1,250
Retail, business premises	\$150	\$300	\$50	\$125	\$2,500
Education & schools	\$150	\$300	\$50	\$125	\$2,500
Health services	\$150	\$300	\$50	\$125	\$3,000
Medium Density Development	incl in build	incl in build	incl in build	\$125	\$1,800
Apartment dwellings (low rise)	incl in build	incl in build	incl in build	\$125	\$2,300
Apartment dwellings (high rise)	incl in build	incl in build	incl in build	\$125	\$2,500

Source: Rawlinsons (2020)

10.2.2 Summary

The approximate development costs were calculated based on the assumptions outlined above. A breakdown of these costs per development typology is provided below. The total cost of development of the initial precincts is expected to be in the order of \$39 billion. These costs will be revised as further detail on development typologies becomes available.

Table 32 - Cost Summary

Development Typology	Aerotropolis Core	Badgerys Creek	Agribusiness	Northern Gateway
Freight and Logistics	\$1,941,983,559	\$2,963,301,716	\$6,562,531,757	\$5,169,037,476
Warehousing	\$1,225,659,574	\$377,981,519	\$837,078,354	\$700,540,605
Retail, business premises	\$12,012,937,188	\$499,694,015	\$1,106,623,002	\$1,852,238,429
Education & schools	\$630,050,077			
Health services	\$373,217,941			
Medium Density Development	\$1,408,631,899			
Apartments (low rise)	\$1,102,105,519			
Apartments (high rise)	\$279,669,237			
Total	\$18,974,254,994	\$3,840,977,250	\$8,506,233,114	\$7,721,816,510

11 Section 7.12 Contribution Plan Rate

A summary of the total development costs, Section 7.12 infrastructure costs and applicable Section 7.12 contribution rate is provided in Table 33.

An administration fee has been added to the proposed levy (as is permissible in the draft guidelines) to account for the scale of additional resources that will be required by both Councils to implement and manage the contributions plan.

Table 33 - Proposed Section 7.12 Contribution Rate

Component	Total
Development Costs	\$ 39,043,281,868
Engineering Infrastructure Costs	\$726,846,560
Social Infrastructure Costs	\$203,161,243
Land Acquisition Costs	\$1,624,098,812
Sub-Total (Infrastructure & Land Acquisition)	\$2,554,106,616
Plan Administration (0.2% of the Infrastructure Costs)	\$1,860,016
Proposed Section 7.12 Levy Rate	6.5%

The proposed Section 7.12 levy rate was converted to a contribution rate per net developable hectare to provide a comparison against similar local contribution plans for predominantly industrial/employment areas across Western Sydney. The results are provided in Table 34 and show a good correlation with the two most recent Contributions Plans that cover industrial/employment lands (i.e. Marsden Park Industrial and Box Hill Industrial).

Table 34 – Contribution Rate Comparison

Area	LGA	Contribution Rate (\$/ha)
Western Sydney Aerotropolis (This Plan)	Penrith City Council & Liverpool City Council	\$703,008
Box Hill Industrial	The Hills	\$540,000 - \$960,000 [#]
Marsden Park Industrial	Blacktown	\$589,000 - \$905,000 [#]
Eastern Creek Stage 3	Blacktown	\$219,000 or \$385,000 [#]

[#] Contributions rates are stormwater catchment dependent

Appendix A – Assumptions

#	Planning & Land Use Assumptions		Source
1.1	The Aerotropolis Section 7.12 Plan will apply only to land within the initial Precincts.		N/A
1.2	The Sydney Science Park has been excluded from the Section 7.12 Area		Existing Agreed VPA with Penrith City Council
1.3	Population and job projections have been extracted from the <i>Western Sydney Aerotropolis Plan (WSAP)</i> .		WSAP
1.4	The upper range value has been adopted to provide a conservative approach to infrastructure estimation. For employment, the following projections were adopted:		WSAP
	Aerotropolis Core	60,000	WSAP
	Badgerys Creek	11,000	WSAP
	Agribusiness	10,000	WSAP
	Northern Gateway	21,000	WSAP
	Mamre Road	17,000	WSAP
	For population, the following projection was adopted:		
	Aerotropolis Core	24,000	WSAP
1.5	All dwellings within the Northern Gateway Precinct are located within the Sydney Science Park site, per 1.1 the Sydney Science Park has been excluded from the S7.12 Area.		WSAP
1.6	Land Budget allowance for Constrained Land (flooding, heritage, etc.) and Corridors	15%	IDC assumption
1.7	Aerotropolis Core Enterprise zone will be comprised of:		
	Freight and Logistics	40%	Solved to match the projections in WSAP
	Warehouse	20%	Solved to match the projections in WSAP
	Retail	40%	Solved to match the projections in WSAP
1.8	Aerotropolis Core the Mixed-Use zone will be comprised of:		
	Warehouse	5%	Solved to match the projections in WSAP
	Retail	40%	Solved to match the projections in WSAP
	Education & Schools	10%	Solved to match the projections in WSAP
	Health Services	5%	Solved to match the projections in WSAP
	Residential	40%	Solved to match the projections in WSAP
1.9	Northern Gateway Enterprise zone will be comprised of:		
	Freight and Logistics	80%	Solved to match the projections in WSAP
	Warehouse	10%	Solved to match the projections in WSAP
	Retail	10%	Solved to match the projections in WSAP
1.10	For all Precinct, except for the Northern Gateway, the Enterprise, Agribusiness and Industrial zones will be comprised of:		

	Freight and Logistics	85%	Solved to match the projections in WSAP
	Warehouse	10%	Solved to match the projections in WSAP
	Retail	5%	Solved to match the projections in WSAP
1.11	Assumed average site coverage for employment development typologies:		
	Freight and Logistics	0.50	Benchmarked Developments
	Warehouse	0.50	Benchmarked Developments
	Retail	0.50	Benchmarked Developments
	Education & Schools	0.50	Benchmarked Developments
	Health Services	0.50	Benchmarked Developments
1.12	Assumed GFA for Retail (Bulky Goods)	0.75	Benchmarked Developments
	Assumed GFA for Retail/Commercial	1.00	Benchmarked Developments
1.13	Assumed average GFA for residential development typologies:		
	Medium Density	180	IDC assumption
	Apartments (low rise)	110	IDC assumption
	Apartments (high rise)	90	IDC assumption
1.14	Residential Development Typology Split		
	Low Density	0%	IDC assumption
	Medium Density	50%	IDC assumption
	Apartments Low Rise	40%	IDC assumption
	Apartments High Rise	10%	IDC assumption
1.15	Dwelling Densities (dwellings per hectare)		
	Low Density	17	Review of other Contributions plans, ABS data & GSC projections
	Medium Density	32	Review of other Contributions plans, ABS data & GSC projections
	Apartments Low Rise	55	Stage 1 LUIP
	Apartments High Rise	80	Stage 1 LUIP
1.16	Dwelling Occupation Rates (population per dwelling)		
	Medium Density	3.00	Review of other Contributions plans, ABS data & GSC projections
	Apartments Low Rise	2.40	Review of other Contributions plans, ABS data & GSC projections
	Apartments High Rise	2.10	Review of other Contributions plans, ABS data & GSC projections
1.17	Employment Rates (Jobs per square metre)		
	Freight and Logistics	300	NSW DPIE Mamre Road Precinct Report (2019)
	Warehouse	150	NSW DPIE Mamre Road Precinct Report (2019)

	Retail	80	SGS Economics (2015)
	Education & Schools	80	SGS Economics (2015)
	Health Services	80	SGS Economics (2015)
	Agribusiness	500	IDC Estimate
1.18	Road Rates		
	Flex Zone Composition		
	Local Collector (pavement percentage)	50%	IDC assumption
	High Street (pavement percentage)	75%	IDC assumption
	Industrial Road (pavement percentage)	50%	IDC assumption
	Assumed Recycled water "Purple Pipe" reticulation on all roads	Yes	IDC assumption
	Percentage of Collector road corridors with no land acquisition required (i.e. Use existing road corridors)	40.0%	Badgerys Creek and Aerotropolis Core only - Based on Aerial Imagery
	Percentage of Collector road corridors with no land acquisition required (i.e. Use existing road corridors)	15.0%	Northern Gateway and Agribusiness only - Based on Aerial Imagery
	Design, Legal, professional fees for road designs	12.5%	IDC assumption
1.19	Drainage Costs		
	On-Site Detention Basin costs (\$/m ³)	\$ 130	From IPARTs benchmarking of several CPs unit costs
	Raingarden Basin costs (\$/m ³)	\$ 550	From IPARTs benchmarking of several CPs unit costs
	Mixed Use On-Site Detention Basin Size (% of NDA)	2.7%	Benchmarked Rates
	Mixed Use Raingarden Size (% of NDA)	1.8%	Benchmarked Rates
	Enterprise, Agribusiness & Industrial On-Site Detention Basin Size (% of NDA)	2.7%	Benchmarked Rates
	Enterprise, Agribusiness & Industrial Raingarden Size (% of NDA)	1.8%	Benchmarked Rates
1.20	Precinct Costs		
	Freight & Logistics and Warehouse Developable Land Acquisition Rate (\$/m ²)	\$ 400.00	Atlas Urban Economics
	Freight & Logistics and Warehouse Constrained Land Acquisition Rate (\$/m ²)	\$ 85.00	
	Retail (Bulky Goods) Developable Land Acquisition Rate (\$/m ²)	\$ 500.00	
	Retail (Bulky Goods) Constrained Land Acquisition Rate (\$/m ²)	\$ 85.00	
	Retail/Commercial Developable Land Acquisition Rate (\$/m ²)	\$2,000.00	
	Retail/Commercial Constrained Land Acquisition Rate (\$/m ²)	\$ 85.00	
	Education & Health Services Developable Land Acquisition Rate (\$/m ²)	\$ 200.00	
	Education & Health Services Constrained Land Acquisition Rate (\$/m ²)	\$ 85.00	
	Medium Density Developable Land Acquisition Rate (\$/m ²)	\$ 800.00	
	Medium Density Constrained Land Acquisition Rate (\$/m ²)	\$ 85.00	
	Apartments (Low Rise) Developable Land Acquisition Rate (\$/m ²)	\$ 1,500.00	
	Apartments (Low Rise) Constrained Land Acquisition Rate (\$/m ²)	\$ 85.00	

	Apartments (High Rise) Developable Land Acquisition Rate (\$/m ²)	\$2,000.00	
	Apartments (High Rise) Constrained Land Acquisition Rate (\$/m ²)	\$ 85.00	
	Passive Open Space Acquisition (\$/m ²)	\$ 85.00	
	Active Open Space Acquisition (\$/m ²) (estimated rate based on land use mix)	\$ 800.00	
	Social Infrastructure Acquisition (estimated rate based on land use mix)	\$ 800.00	

Appendix B – Social Infrastructure Benchmarks

Benchmarks Used for Social Infrastructure

Table 35 – Social Infrastructure & Indoor Recreation Infrastructure Needs

Facility	Source	Benchmark/Evidence
Regional Facilities 50,000 and over		
Central library	NSW State Library	1:50,000 to 150,000 people
Major civic/performance space	Growth Centre Commission	2,000m ² to 4,000m ² GFA to 100,000 to 150,000 people
Library floorspace	Liverpool City Council	42m ² per 100 people
Indoor leisure centre (dry)	Parks and leisure 2012	1:50,000 to 100,000 people
Indoor leisure centre (wet)	Growth Centre Commission	1:30,000 to 60,000 people
District Level Facilities 20,000 – 50,000		
Community floorspace		
Branch library	Liverpool City Council	1:10,000 to 15,000 people
Community exhibition space	Growth Centre Commission	1:20,000 to 30,000 people
Multi-purpose community centre	Growth Centre Commission	1:20,000 to 30,000 people
Multi-purpose community centre (floorspace)	Liverpool City Council	0.022m ² per resident
Performing arts centre	Growth Centre Commission	Approx. 800 – 1,000m ² , co-located with multi-purpose centre for every 40,000 – 50,000 people
Function and conference centre	Growth Centre Commission	1:20,000 to 30,000 people
Out of School Hours Care	Based on National Usage rates in Australia of 16% all children accessing OSHC	0.16 places per child
Local/Neighbourhood Level 10 to 20,000 people		
Community meeting room/small hall/small community centre		1:6,000 to 15,000 people
Early education and care (0 to 5)	Liverpool City Council	1 place per 8 children aged 0-4

Quantity Benchmarks Used for Open Space

Table 36 - Quantity Benchmark Requirements for Open Space

Hierarchy	Benchmark	Size
Council S94 Plan		
Per person	2.83ha per 1,000	N/A
Government Architect NSW (specifically for greenfield sites)		
Local Parks	1 per 2,500 people	Average size > 0.5ha Minimum size 0.3ha
District Parks	1 per 5,000 people	Average size > 5 ha Minimum size 2ha
Linear parks, other multiple use open space	N/A for linear	Minimum 20m wide
Major destination parks/city wide parks	1 per 20,000 people	No average. Minimum size 20ha, can be less depending on design and focus.
Office of Sport/Growth Centres Commission/Parks and Leisure Australia		
District sports grounds	2 double playing fields (4 fields total) and amenities per 10,000 people	10ha
Multi-purpose outdoor courts	1:4,200 people	approx. 0.05ha per court + runoff space and amenities
Play space	1 play space per 2000 people	100m ² minimum within a park
Outdoor fitness stations	1 station per 15,000 people	Varies - could be provided as multiple nodes along a recreation trail or one larger facility
Pools	1 station per 15,000 people	50m pool (competition standard)
	1:30,000	25m leisure pool

Distribution Benchmarks Used for Open Space

Table 37 – Distribution Benchmarks Used for Open Space

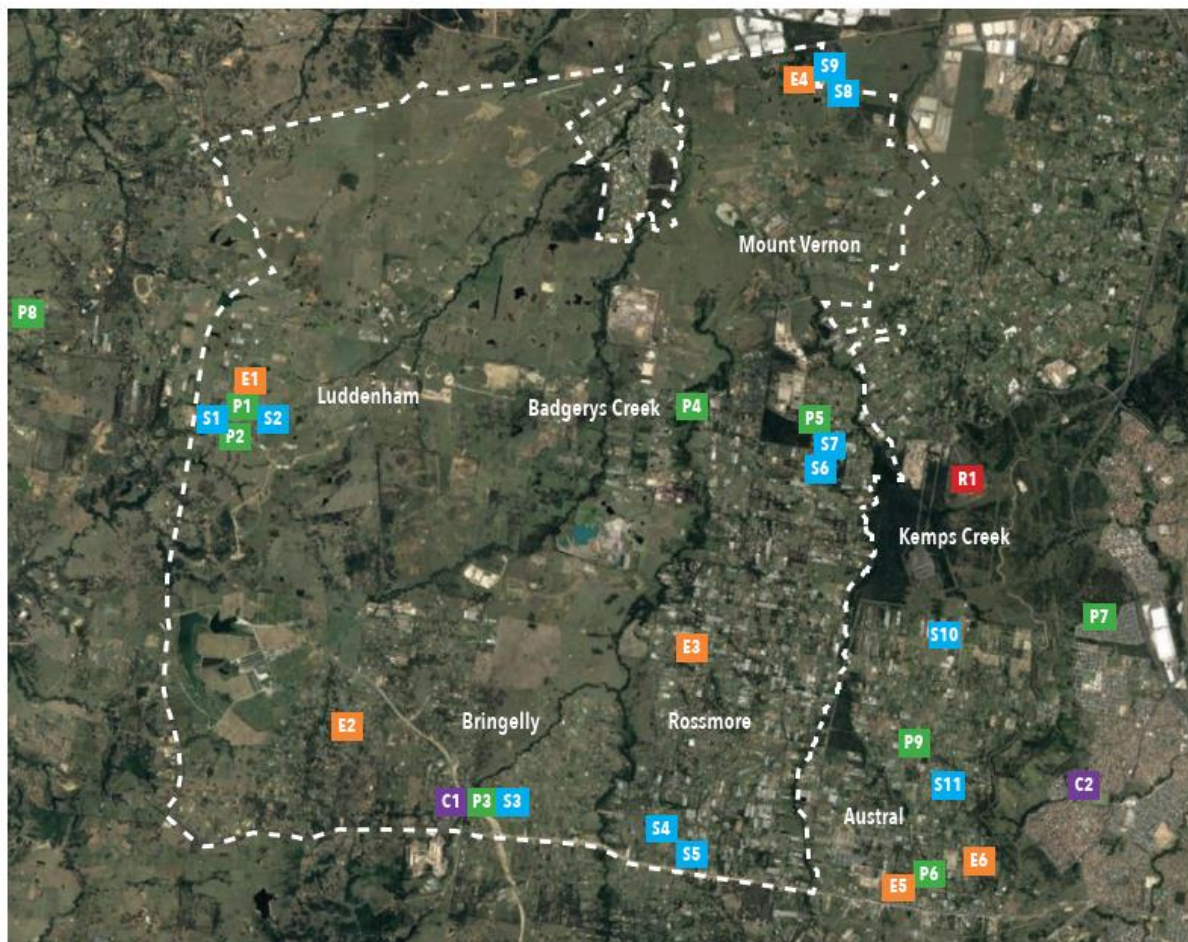
Hierarchy	Distribution/Rate
Greater Sydney Commission/Government Architect NSW (Greener Places Open Space for Recreation Guide (Issue no.1 2018, Draft for Discussion))	
Regional park	within 5 to 10km to all residents
District park	within 2km to all residents
Local park	within 400m walkable of all residents, with walkable connections and no major barriers
High density areas	within 200m of all residents living in high density, with walkable connections and no major barriers

Appendix C – Social Infrastructure Audit

Table 38 - Audit Methodology

Type	Methodology	Source
Open space	Desktop analysis using a combination of six maps, Council's website which has some information on sport and recreation facilities and satellite imagery to further explore recreation facilities within parks.	Six maps Liverpool/Penrith website Google earth
Community Facilities	Desktop analysis using Council's website	Liverpool/Penrith website
Childcare	Desktop analysis by suburb using the Australian Children's Education & Care Quality Authority (ACECQA) audit	ACECQA
Schools	Desktop analysis by suburb using 'my school' a national audit of schools containing consistent data about every school in Australia (https://www.myschool.edu.au/)	My school
Regional cultural facilities	Desktop search and Council websites (Penrith, Liverpool, Blacktown, Bankstown)	Council websites Google searches
Local/District/Regional Libraries	Desktop search and Council websites	Penrith/Liverpool Websites

Figure 24 - Aerotropolis Social Infrastructure and Open Space Audit



KEY

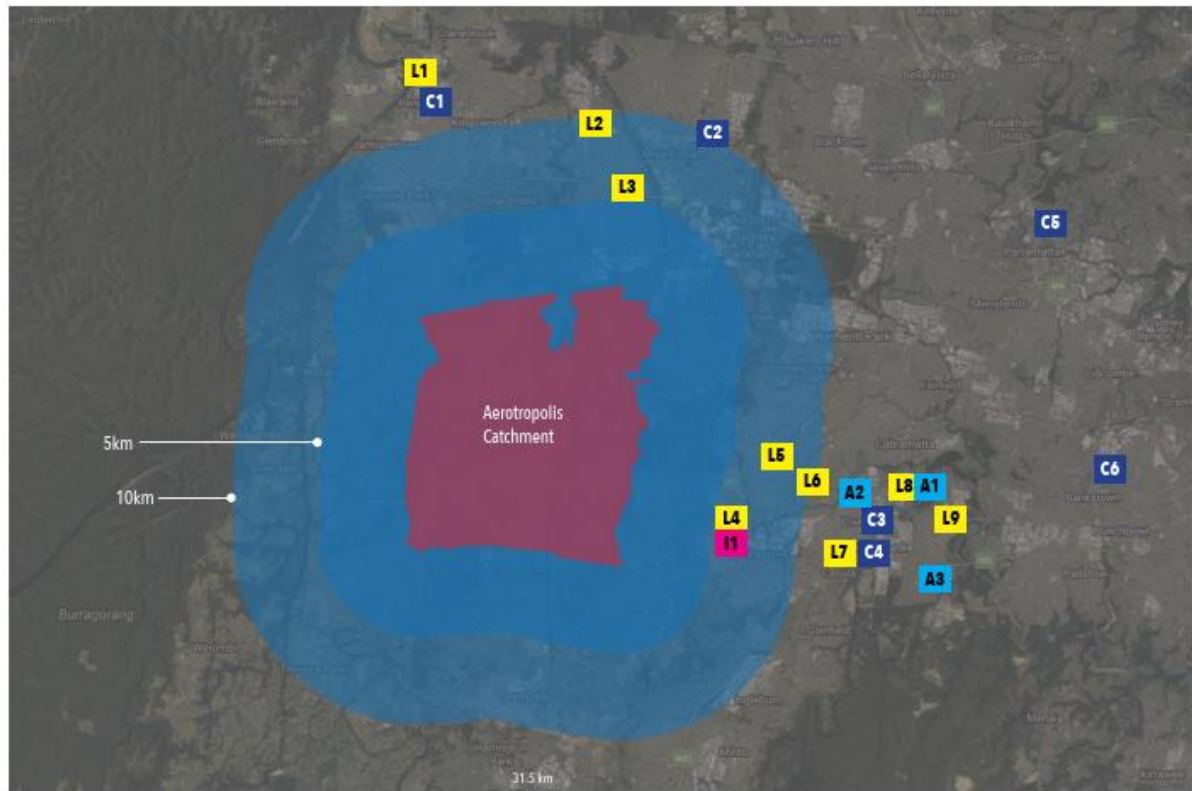
- Child Care & Early Education
- Open space and sports facilities
- Community Facilities
- Indoor Recreation
- Schools

E1	Luddenham Child Care Centre
E2	Bringelly Child Care Centre
E3	Clementson Drive Early Educational Centre
E4	Annabelle Early Learning Centre
E5	Community Kids Austral Early Education Centre
P1	Sales Park
P2	Robert Green Oval
P3	Bringelly Park
P4	Overett Reserve

P5	Bill Anderson Reserve
P6	WV Scott Memorial Park
P7	Catalina Park
P8	Wallacia Memorial Park
P9	Craik Park
C1	Bringelly Community Centre
C2	Greenway Park Community Centre
R1	Sydney International Shooting Centre

S1	Holy Family Catholic Primary school
S2	Luddenham public school
S3	Bringelly public school
S4	Bellfield College
S5	Rossmore public school
S6	Kemps Creek Public School
S7	Christadelphian Heritage College Sydney
S8	Emmaus Catholic College
S9	Trinity Primary School
S10	Al-faisal College
S11	Austral Public School

Figure 25 - Aerotropolis Regional Social Infrastructure and Open Space Audit



KEY

- L1 Library
- C1 Large cultural facilities

- A1 Aquatic Centre
- I1 Leisure/indoor recreation

L1	Penrith City Library
L2	St Marys Library
L3	St Clair Library
L4	Carnes Hills Library
L5	Green Valley Library
L6	Miller Library
L7	Casula Library
L8	Liverpool Library
L9	Moorebank Library

C1	Joan Sutherland Performing Arts Centre
C2	Sydney Coliseum Theatre
C3	Liverpool Regional Museum and Family History Centre
C4	Casula Powerhouse Arts Centre
C5	Riverside Theatre
C6	Bryan Brown Theatre

I1	Michael Clarke Recreation Centre
A1	Michael Wenden Aquatic Leisure Centre,
A2	Whitlam Leisure Centre
A3	Holsworthy Aquatic Centre