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WESTERN SYDNEY AEROTROPOLIS BRANDESIGN AND BANDSCAPE PLAN REPORT

Final Report

Prepared for Western Sydney Planning Partnership Hassell © 17 December 2021



The Aerotropolis will be a coordinated urban system complementing the role and function of Western Sydney International (Nancy-Bird Walton) Airport. Connectivity across transport, open space, the undisturbed soil network and centre types is critical to ensuring it evolves into a dense, jobs focused economic hub.



AEROTROPOLIS VISION



The Aerotropolis is Australia's newest global gateway, built around the world class Western Sydney International (Nancy-Bird Walton) Airport. Its evolution has driven transformational change in the Western Parkland City. Development is framed around the Wianamatta–South Creek corridor and an expansive network of parklands and waterways to realise the cool and connected Western Parkland City. Above all, it respects and connects Country. It creates opportunity, amenity and sustainability for workers and residents in Western Sydney.







BUILDING ON THE WSAP VISION

WESTERN SYDNEY AEROTROPOLIS PLAN OBJECTIVES

The Western Sydney Aerotropolis Plan provides the direction for precinct planning and has informed the spatial principles applying to the urban design frameworks across each initial precinct.

The WSAP balances this with an ambitious 'landscape-led' planning approach, where the structure and places of the Aerotropolis are defined by the Blue–Green Infrastructure Framework – a network of blue and green spaces and assets such as waterways, open spaces and tree canopy.

The WSAP begins by establishing a vision, objectives and principles to give effect to these objectives. It identifies the intended land use planning outcomes for each of the 10 precincts and a sequenced approach to precinct planning that optimises investment in major infrastructure and creates the impetus to activate the Aerotropolis early.

The WSAP gives effect to 4 themes, **11** objectives and 50 principles. These have been carried forward spatially to derive the urban design and landscape plans for the initial precincts.





URBAN DESIGN PRINCIPLES

SUSTAINABILITY



Join landscape with water

- The Blue-Green Infrastructure Framework is implemented through retention of ephemeral creeks, application of high quality water retention within the landscape and application of multiple use drainage and open space
- 1% AEP flood zones are zoned for Environment and Recreation
- Streets are designed to provide appropriate WSUD outcomes in order to meet Wianamatta - South Creek urban water drainage targets
- Locate active and passive areas adjacent to water focused open space to enable an activated system
- Ensure the open space system is a connected network, providing amenity for employment areas and an active, green frame for dense mixed use neighbourhoods
- Water in the landscape can benefit urban cooling



Wianamatta - South Creek is an ecological corridor

- The Wianamatta South Creek, Badgerys, Thompsons and Cosgroves Creek system will be enhanced as a critical ecological corridor through the Aerotropolis
- High risk flood areas will be retained for existing ecology and water functions
- Medium risk flood areas will contain active transport, ecology and flood flow path functions
- Low risk flood areas may contain active open space, whilst also performing a flood flow path function
- The ecological function of the Wianamatta
 South Creek system will be enhanced through a connected network of open space located to retain existing important vegetation



Ephemeral creeks retained in open space and riparian boulevards

- Creeks, including ephemeral waterways, are retained to their natural flow path and contours, in open space, from Strahler category 3 and higher
- Creeks with a Strahler category of 1 and 2 retained in function as part of the street network
- The ecology of the ephemeral creek systems will be improved through local endemic species planting
- Planting and landscape design will ensure stormwater flow rates allow the continued ecological health of the broader Wianamatta
 South Creek system (including to limit corridor flows and erosion)
- Design of retained creeks and associated open space should enable existing soil profiles to be maintained so that salinity risks can be minimised

Western Sydney Aerotropolis Urban Design and Landscape Plan Report

CONNECTIVITY

ECINCT LOCAL M ß R ß B 虩 Ś

Maximise benefit of and connectivity to Metro

- Sydney Metro Western Sydney Airport Line stations will be supported by high quality public realm, dense mixed use neighbourhoods, an intensity of jobs and good connectivity with other forms of public and active transport
- Neighbourhoods are designed to offer walkable catchments to Sydney Metro Western Sydney Airport Line Stations
- Neighbourhoods are designed to enable connectivity from public transport to open space amenity



A connected and permeable urban structure

- Streets across the mixed use and employment zones are designed to provide a connected, legible and permeable network
- Street networks are designed to continue into future stages, including across arterial roads where appropriate
- A hierarchy of street types is provided that enables highly walkable, comfortable and amenable streets in centres, the mixed use zone and throughout the employment zone
- Existing streets are utilised as existing infrastructure and built upon to expand and upgrade the network
- The broader street network offers good accessibility to public transport and active transport modes
- Access to public transport capable streets is no greater than a 400 metre walk from job or living locations
- Development blocks and buildings are designed to interface positively with all street

CONNECTED

Provide regular creek crossings

- The public realm and street network will be designed to enable convenient, comfortable and safe walking and bicycle access to the Wianamatta - South Creek, Thompsons, Badgerys and Cosgroves Creek systems
- Regular creek crossings will be provided to support walkable catchments, ideally every 400 metres
- Bridges and active transport connections within the creek corridors will be designed to access points of amenity such as centres, district and regional open spaces
- Key active transport spines will be co-located with creek corridors to match accessibility with parkland amenity

PRODUCTIVITY AND LIVEABILITY



Centres provide a focus to all neighbourhoods

- All neighbourhoods, be they for employment or mixed use purposes, have walkable access to a centre, point of focus or recreation amenity
- Centres are distributed throughout the Aerotropolis according to hierarchy
- Centres are located to leverage public transport accessibility, and key transport spines provide walkable access to centres Centres are located to estivute encourses
- Centres are located to activate open space, and creek corridors
 Within the mixed use zone, centres should
- within the mixed use zone, centres should co-locate social infrastructure such as schools, libraries and community centres



Neighbourhoods are walkable to propel activity

- Neighbourhoods are designed to provide a site responsive and highly connected street network
- Street blocks are configured to support a walkable and permeable network
- Streets are designed to facilitate walking, cycling and public transport use
- Streets are aligned to provide direct accessibility to centres, creeks and open spaces
- All neighbourhoods, be they employment or mixed use in focus, will employ Crime Prevention Through Urban Design principles to ensure safe and comfortable outcomes



Activity and amenity to creek corridors

- Neighbourhoods are designed to align areas of density with areas of high amenity, such as open space, creek corridors and public transport
- Neighbourhoods are designed to facilitate convenient accessibility from public transport spines to dense areas around open space amenity

PLACE AND BUILT FORM



Urban structure responds to Country (land, water, sky)

- The urban structure is arranged across the Aerotropolis to respond to key landmarks and the natural topography / landform
- Important visual connections between landmarks in the landscape are maintained through arrangement of open space, streets and built form
- Ridgetops are recognisable within the urban form of the Aerotropolis
- Visual connectivity is provided throughout the Aerotropolis between water, land and sky
- Creek lines are maintained in open space
 Important sites of Indigenous Heritage significance are retained, protected and

connected in open space



Streets visually and physically connect with landscape

- The structure of neighbourhoods and the associated street system will provide direct views throughout to areas of open space, creeks or topography
- The scenic values of regional, district and local landforms are accommodated in the layout of neighbourhoods
- Movement systems provide a public interface to areas of open space



Urban development respects landform

- Connect ridgetops to creeks
- Ridgetops are recognisable in the urban layout of neighbourhoods
- Local parks on ridgetops should be provided to prominent hills and at coordinated points along longer ridgelines
- Urban streets are arranged to directly connect ridgetops with creeks
- Where possible, ephemeral creeks are used to connect ridgetops to the Wianamatta -South Creek system
- Large retaining between development lots and flood lines should be avoided
- Streets adjacent to creeks should as close as possible align to existing topographical contours

The Aerotropolis applies a new model of city making - founded on Country, landscape and sustainability principles. It will be a place of boundless opportunity, where the Western Sydney International (Nancy-Bird Walton) Airport offers connections to the globe for a thousands of future focused businesses.

It is a place of inclusion, where everyone has access to the best of Western Sydney's amenity. Rapid transit and world class parkland provide a launchpad for thousands of new jobs, establishing the Core as the place to be in Western Sydney.

This is a place for future generations. The city framework for the Aerotropolis focuses on custodianship. What we do now sets in motion a path towards a sustainable city that will nurture people, landscape, culture and Country.

The landscape-led design approach to the Aerotropolis means Country and its landscape are at the heart of the city. Creeks, parkland, ecology and water envelop dense urban neighbourhoods and employment areas. This serves to create a distinct place like no other, because it is of its place; where ridgetops roll into ephemeral creek systems; where parks frame city neighbourhoods; and where the ecology of place can thrive.

WIANAMATTA **CUSTODIANSHIP**

The Wlanamatta system is fundamental to the Aerotropolis. A sacred place for First Peoples, it will be retained as open space and enhanced for its water, ecology and recreation functions.

The Wianamatta holds the Aerotropolis. As a place of water, it is the life source for the city, and its conservation is fundamental to Western Sydney's future.

A CITY OF THE LANDSCAPE | REALISING THE 30 MINUTE | CITY

The Aerotropolis and its initial precincts provide a framework for the 30 minute city to be exemplified. With rapid transit provided by Metro connections, the thousands of jobs throughout the Aerotropolis are within easy reach for Western Sydney residents. Rapid bus connections to Campbelltown, Penrith and Liverpool further bolster jobs accessibility. At a local scale, walkable neighbourhoods offer excellent accessibility to centres, social infrastructure and parkland. Everything is within 30 minutes.

KNOWLEDGE RICH AND SOCIALLY INCLUSIVE

The accessibility, export, amenity and landscape qualities of the Aerotropolis provide the right conditions for a host of new business to be established. With a focus on the knowledge economy, high quality, export oriented jobs will form a key tranche of the local economy.

The Aerotropolis is for everyone. Easily accessible, its urban and parkland landscapes offer huge opportunity for Western Sydney residents to benefit from the boundless future.

A GATEWAY TO THE GLOBE

Thousands of hectares of employment land will provide places for businesses to thrive. Taking advantage of the immediate global access the airport provides, future focused businesses will be able to leverage the export opportunities available to them. From agribusiness, to advanced manufacturing and smart logistics, boundless opportunities are available for new economies to emerge.

The arrangement of the city will provide a new front door to Sydney and Australia. The unique landscape setting provides a fundamentally Western Sydney arrival experience, encouraging visitor attraction and thriving local businesses.

Note: This project has considered the extent of the Wianamatta-South Creek corridor adjacent to the initial precincts. Future precinct planning work throughout the Rossmore and Kemps Creek precincts will consider appropriate land use, urban design and landscape outcomes for the additional parts of the Wianamatta-South Creek corridor not addressed in this report.



BLUE AND GREEN INFRASTRUCTURE FRANCE AND GREEN INFRASTRUCTURE FRANCE AND GREEN FRANCE AND FRANCE AND GREEN FRANCE AND FRANCE AND FRANCE AND FRANCE FRANCE AND FRANCE AN

The Aerotropolis will have compact urban form - a place where centres and local communities are connected by walking, cycling, interaction and collaboration. A compact urban form minimises the urban footprint and leaves more land for open spaces, waterways and recreation areas. It allows people to access a diversity of uses within walking distance of centres, open space or transport.

- Western Sydney Aerotropolis Plan, pp 23.

The urban design frameworks are informed by the Western Parkland City Landscape-Led Urban Design Guidelines (Infrastructure NSW, Tyrrell Studio). Open space throughout the Aerotropolis needs to accommodate a range of functions beyond active recreation to ensure place-based and sustainability outcomes. This includes:

- Water: Detention and stormwater flow paths along ephemeral creek corridors to the Wianamatta system (or Nepean system in parts of the Agribusiness precinct)
- Perviousness: Areas of landscape where rainwater can permeate the soil profile, helping minimise stormwater run-off
- Urban Cooling: Areas for tree canopy and 'green' spaces that provide transpiration to cool surrounding areas
- Heritage: Celebrating culture and promoting access to Country through the cultural landscape including listed heritage sites
- Biodiversity: Providing a foundation for the conservation and enhancement of important vegetation communities
- Corridors for wildlife migration

THE BLUE-GREEN INFRASTRUCTURE FRAMEWORK

The following elements form the core of the framework:

Physical elements:

- → Alluvial corridors 1% AEP year flood zone of major creeks
- \rightarrow The Filigree of creeks and dams
- \rightarrow Ridgelines
- Western Sydney Aerotropolis Urban Design and Landscape Plan Report

→ Remnant vegetation with biodiversity values

Intangible and visual elements:

- \rightarrow Connection with Country
- → Context of existing broader landscape
- → Cumberland Plain character - grasslands with groups of trees within gently undulating landscape
- → Rhythm of undulating terrain of creeks and ridgelines
- → Views beyond the precinct to landscape landmarks - for example to the Blue Mountains
- ightarrow Open views to big sky

Areas for specific needs of the natural system have been included. These are designated primarily for environmental protection, and include generous linear parks along creeks to accommodate water retention within the landscape and corridors to allow for wildlife to migrate through the urban fabric.

The urban fabric engages with this open space framework; amenities are oriented to the parks. Nature and its elements are an integral part of a daily life for workers, residents and visitors of Aerotropolis.

It is acknowledged the Aerotropolis precinct will be profoundly altered from its current rural setting. However, by employing landscape led urbanism principles and embedding key landscape elements of this place as an organising structure of the open space framework, the core character of this place can be preserved, protected and enhanced.



STORMWATER AND WATER CYCLE MANAGEMENT

A Stormwater and Water Cycle Management Study has been prepared by Sydney Water to outline how stormwater, wastewater, recycled water as well as trunk drainage and riparian zones, should be managed in the initial precincts of the Aerotropolis.

INTEGRATED WATER SERVICING

Water servicing for precincts is to feature total water cycle management that integrates and balances drinking water, wastewater, recycled wastewater and harvested stormwater. The integrated water management strategy developed by Sydney Water ensures water servicing will minimise demands on potable water supplies through alternative water sources.

Recycled wastewater will be provided to the area. Sydney Water has developed a proposed recycled water supply network from the Upper South Creek Advanced Water Recycling Centre at the Sub Regional planning level to service non-drinking uses across the Aerotropolis.

The balance of recycled water and harvested stormwater has been calibrated to achieve waterway health outcomes.

The table overleaf provides an overview of Sydney Water's drinking water and wastewater servicing strategy.

Recommendations:

→ Water servicing for precincts is to feature total water cycle management that integrates and balances drinking water, wastewater, recycled wastewater and harvested stormwater.

- → All open spaces, areas of landscaping, parks and streets must be developed to include irrigation infrastructure to provide expected urban cooling benefits.
- → The integrated water management approach ensures water servicing will minimise demands on potable water supplies through optimizing the use of alternative water sources, such as stormwater and recycled water.
- → Stormwater should be prioritised for non-potable uses with recycled water used as a back up in order to meet NSW Government waterway health objectives.

Timing	Measures
Drinking Water	
Existing	Each of the initial precincts fall in Cecil Park Water Supply Zone within the Prospect South Delivery System and currently have limited to no water services available.
	Cecil Park Reservoirs are currently at capacity and cannot accommodate demands from new developments without the additional proposed amplification work to transfer flow from Liverpool and trunk infrastructure proposed within Cecil Park Water Supply Zone (WSZ).
Interim	Sydney Water is committed to provide services to early developments.
	Sydney Water is currently delivering the following trunk drinking water infrastructure to increase supply to the area:
	 → Rising Main (DN900) and pump WP0432 at Liverpool → DN1200/DN1050 from Cecil Park reservoir up to Western Road, with offtakes at Range Road and Western Road connecting existing mains in Elizabeth Drive.
	This work is in delivery and proposed to be operational in 2022.
	Sydney Water is also planning to deliver trunk infrastructure to support growth and major projects along Elizabeth Drive and Luddenham Road. Interim servicing may include offtakes from proposed mains in Elizabeth Drive to Badgerys Creek, Agribusiness and Northern Gateway precincts.
	Interim servicing for Aerotropolis Core precinct would be through proposed Oran Park Reservoir via Northern Road mains.
Ultimate	The current ultimate drinking water supply strategy for these precincts is to supply from Prospect South delivery system via the Cecil Park water supply zone and a proposed new water supply zone. A new reservoir (60ML) is proposed in the west at the end of Elizabeth Drive within the Agribusiness precinct.
	New drinking water reservoirs, pumping stations and trunk mains are required to fully service the precincts.
Wastewater	
Existing	Each of the initial precincts currently has very limited wastewater servicing available, with most areas relying on septic tanks for wastewater disposal.
Interim	Sydney Water is committed to working with developers for interim servicing to early developments prior to 2025/26. Interim servicing may include decentralised wastewater treatment, tankering or interim pumped transfer. Interim servicing would be designed for transition to long term servicing with the timing of transition to be assessed on a case by case basis.
Ultimate	To fully service the region requires several wastewater pumping stations (WWPS) and deep gravity trunk mains. Several new pressure mains will transfer flows to the proposed Upper South Creek Advanced Water Recycling Centre (USC AWRC). The AWRC first stage completion is targeted for mid2025. Trunk wastewater infrastructure is planned to be delivered in stages based on DPIE growth forecasts. The first stages are planned to be delivered in line with operation of the new AWRC.

WATERWAY HEALTH

Landscape led planning is being applied to orient new urban development around the network of waterways that provide the central landscape features for the region. This planning recognises the cultural, ecological and recreational values of those waterways and includes Government water quality and flow-related objectives that aim to preserve and restore those values. These objectives were developed through the application of the NSW **Government's Risk-based Framework** for Considering Waterway Health **Outcomes in Strategic Land use Planning Decisions (risk-based** framework).

The Stormwater and Water Cycle Management Study adopts these objectives and demonstrates how a range of integrated water cycle strategies are required. The study also recognizes the need for water management to address a range of other government objectives regarding open space, active transport, native vegetation, riparian vegetation policy, urban cooling, flooding and airport specific risk management. Achieving a reduction in stormwater runoff volumes represents a shift in stormwater management that requires a combination of at-source controls, stormwater harvesting and vegetated Water Sensitive Urban Design (WSUD) elements including biofiltration and wetlands, that can mimic the existing hydrological characteristics of the rural catchment.

Recommendations:

- → Development within the Aerotropolis is to ensure waterways, riparian corridors, selected farm dams, open water bodies and other water dependent ecosystems are protected, restored and maintained.
- → All development and public infrastructure must comply with, and contribute towards, the water quality and flow-related objectives developed by the NSW Government under the Risk Based Framework for Considering Waterway Health Outcomes in Strategic Land Use Decisions.
- → All development must also meet the stormwater targets set out in the Aerotropolis Development Control Plan.

STORMWATER SYSTEM

A range of trunk drainage and preferred WSUD stormwater management elements have been developed through consultation with Penrith and Liverpool Councils

These WSUD elements work together to preserve the local waterways that cross the precincts as well as waterways in the lower catchment.

Achieving the stormwater management targets will require an approach that is focused on the retention and harvesting of stormwater in the landscape through a combination of:

- → On site measures such as increased perviousness and landscaped areas.
- → On street measures to maximise the retention and evaporative losses of stormwater through vegetated systems including passive irrigation and biofiltration street trees.
- → Regional stormwater infrastructure that includes naturalised trunk drainage channels and wetlands with a centralised reticulated stormwater harvesting scheme. A regional system ensures the achievement of waterway health outcomes efficiently whilst consolidating stormwater elements in the public and private domain.

A coordinated approach will be required to ensure that land- take and maintenance efforts are minimised to a consolidated number of effective stormwater assets located strategically. Sydney Water will be appointed as the trunk drainage manager for the area.

The stormwater system also aims to manage peak flows for frequent (eg 50% Annual Exceedance Probability) and rare events to minimise the risk of stream morphology and flood impacts as a result of increased impervious surfaces associated with the initial precincts. Strategies have been developed that aim to meet these objectives using a combination of stormwater detention on private land and in open space to retard flows to meet existing case peak flows. In consultation with stakeholders the strategy demonstrates that a combination of on-site detention (for industrial and commercial areas), on-line detention (on 1st and 2nd order creeks) through natural drainage design and stormwater assets can sufficiently manage precinct scale runoff and should be employed throughout the Aerotropolis.

Recommendations:

→ Trunk drainage is to be through natural creek lines or constructed natural drainage channels to help manage flows and contribute to biodiversity, public amenity and safety. The ongoing ownership and management of these assets must ensure adequate and sustainable funding for maintenance is available.

- → Urban layouts, streets and drainage are to utilise targets for reduced impervious surfaces to contribute towards the water quality and flow-related objectives for the catchment.
- → Stormwater systems including on private lots, within the streetscape and trunk drainage must be designed to achieve the waterway health, urban cooling, tree canopy and open space outcomes through Water Sensitive Urban Design
- → The stormwater system should be designed in a manner consistent with the NSW Government 'Technical guidance for achieving Wianamatta-South Creek stormwater management targets'
- → The layout of the regional trunk drainage network, including land for stormwater treatment wetlands and ponds are identified and must be allowed for in any development layout.
- → Stormwater assets in the public realm should be designed as multifunctional also contributing to waterway health, biodiversity and public amenity.
- → Stormwater systems should manage peak flows for frequent events to minimise the risk of impacts to stream morphology and flood impacts.

RIPARIAN LAND MANAGEMENT

The protection, restoration and maintenance of waterways, riparian corridors, and water dependent ecosystems is essential in achieving the cultural, social and biodiversity aspirations as well as tree canopy targets for the Parkland City.

Creeks within the initial precincts have been validated and mapped with associated vegetated riparian zones to support waterway health. Water dependent ecosystems and key fish habitat has also been identified and mapped. A high level riparian revegetation strategy was developed recommending the areas and likely costs of riparian land that should be revegetated. **Recommendations:**

- → Vegetated riparian zones (VRZ) adjacent to creeks and other water bodies identified in the riparian corridor assessment must be protected, restored and maintained.
- → Opportunities to revegetate beyond standard VRZs should be explored to maximize biodiversity outcomes and achieve urban canopy targets, particularly within the Wianamatta-South Creek Precinct.
- → The ongoing ownership and management of these assets must ensure adequate access and sustainable funding for maintenance is available.

FLOOD MANAGEMENT

Flood Risk Management is the management of flood risks to life and properties for the full range of flooding to the community for the short and long term. FRM is a strategic approach to understanding the interaction of the full range of flooding (up to the PMF) with the community where it has the ability to cause damage and significant disruption and potential to pose a risk to life. FRM requires an understanding of the flood constraints and risks.

Therefore, in considering flooding, rather than the 1% AEP extent, the highly constrained areas of the floodplain are considered the likely the most appropriate areas to protect for this work. These are the flood function areas of the floodway areas (which typically include the riparian corridor) and to flood storage areas to maintain the conveyance of flow during the 1% AEP event.

The Regional Strategic Flood assessment undertaken for INSW South Creek Sector Review stage 2 and flood Assessment undertaken for the Aerotropolis should inform the requirements for flood risk management. Floodplain risk management objectives are set up to:

- → Ensure development in the floodplain is consistent with the NSW Flood Prone Land
- → Policy and the principles of the NSW Floodplain Development Manual.
- → Maintain the flood function (conveyance and storage) of the floodplain to minimise the impact of development on flood behaviour, and adverse impacts to the existing community.
- → Minimise the flood risk to life and property associated with the use of floodplains,
- → Limit the impacts of flooding on development and its users by allowing development that is compatible with the flood constraints of the land
- → Avoid significant adverse impacts on flood behaviour and the environment.

Recommendations:

- → Manage the conveyance and storage of floodwaters through the floodplain. Ensure development is not located on a floodway area or flood storage area.
- → Allow development on land that is compatible with the land's flood constraints, taking into account projected changes as a result of climate change
- → Ensure the siting and layout of development considers flood constraints including risks to personal safety during the full range of floods. The site layout and ultimate built form of the development should be compatible with the flood constraints and potential risk.
- → Ensure development is to have minimal impact on flood behaviour
- → Ensure strategic planning incorporating management measures to offset development impacts
- → Ensure personal safety of the users of developed areas located on the floodplain for the full range of flooding.

WATER IN THE LANDSCAPE

The vision for Wianamatta-South Creek (and its tributaries) is to become a cool green corridor through the Western Parkland City. and be the core element of liveability and amenity for the residents. This vision relies on urban planners to explicitly keep water in the landscape by integrating waterways into the design of the city and residential neighbourhoods, and for the waterways to be healthy so they can provide the essential services and functions expected of a cool green corridor.

Currently, the Wianamatta-South Creek catchment is the most degraded catchment in the Hawkesbury-Nepean River system due to historical vegetation clearing and urbanisation. Increased urbanisation will further degrade the waterways if stormwater, wastewater and flooding regimes are not managed, upfront through an integrated ecosystem approach. This approach requires the waterways and hydrological cycle to be central considerations in both land use and water infrastructure planning.

To help deliver the vision, the NSW Government has developed performance criteria relevant to:

- → the protection, maintenance and/or restoration of waterways, riparian corridors, water bodies and other water dependent ecosystems that make up the 'blue' components of the Blue-Green Infrastructure Framework
- → a landscape led approach to integrated stormwater management and water sensitive urban design

The performance criteria (Tables 1, 2) are referred to was water quality and flow objectives and apply to all urban developments on land in the precinct. Compliance towards achieving the performance criteria must follow the protocol outlined in the Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land- use Planning Decisions (OEH/

EPA, 2017) Technical guidance for achieving Wianamatta-South Creek stormwater management targets. The performance criteria are responsive to the protection and improvement of the condition of high ecological value waterways and water dependent ecosystems (Refer figure on page 120, DPIE 2022) in the Western Sydney Aerotropolis. These ecosystems include some existing native vegetation (i.e. groundwater dependent vegetation) that are protected under the **Biodiversity Conservation Act** 2016 and Environment Protection and Biodiversity Conservation Act 1999, and some identified as environmentally sensitive waterways and riparian in existing Local Environment Plans. These ecosystems are mostly located in the floodplain, and are home to many threatened, critically endangered and high ecological value species of fauna and flora, including those considered iconic to the area (bass, bats and a range of birds) or are totems for the local Aboriginal communities (e.g. water dragons).

The Riparian Revegetation Corridors Assessment for the Western Sydney Aerotropolis (Sydney Water, 2021) identifies a strategy for the protection and improvement of riparian corridors and other water dependent vegetation. The assessment explicitly accounts for the high ecological value waterways and water dependent ecosystems (as shown in the Figure on page 120), and flood and development constraints, while achieving the Western Parkland City vision using vegetation communities endemic to the Cumberland Plain (CT Environmental 2020).

The performance criteria are also responsive to the intermittent nature of the waterways in the Western Sydney Aerotropolis. To stay intermittent requires considered planning of the stormwater flow paths and consequent volume and timing of discharges. In some instances, there will be a requirement to undertake bed and bank stabilisation works to prevent erosion and provide habitat for fish and other aquatic life.

Recommendations:

- → Achieve the performance criteria for managing the ambient water quality of waterways and water bodies
- → Achieve the performance criteria for managing the ambient flows of waterways
- → Compliance with the performance criteria must be consistent with the NSW Government Technical guidance for achieving Wianamatta-South Creek stormwater management targets.

Table 1 Ambient water quality of waterways and waterbodies in the Western

 Sydney Aerotropolis

Water Quality Objectives	
Total Nitrogen (TN, mg/L)	1.72
Dissolved Inorganic Nitrogen (DIN, mg/L)	0.74
Ammonia (NH3-N, mg/L)	0.08
Oxidised Nitrogen (NOx, mg/L)	0.66
*Total Phosphorus (TP, mg/L)	0.14
Dissolved Inorganic Phosphorus (DIP, mg/L)	0.04
Turbidity (NTU)	50
Total Suspended Solids (TSS, mg/L)	37
Conductivity (µS/cm)	1103
рН	6.20 - 7.60
Dissolved Oxygen (DO, %SAT)	43 - 75
Dissolved Oxygen (DO, mg/L)	8

Table 2 Ambient stream flows and requirements of waterways and waterdependent ecosystems in the Western Sydney Aerotropolis

r 3rd Order Streams or
greater
2.0 1095.0 ± 157.3
604.6 5542.2 ± 320.9
739.2 10091.7 ±
769.7
2048.4 2642.9 to
10091.7
.05 0.03 ± 0.01
3.9 ± 1.2

The Aerotropolis Framework



High ecological value (HEV) waterways, riparian vegetation, water bodies (including farm dams) and other water dependent ecosystems in the Western Sydney Aerotropolis. The map shows the extent of existing high ecological value water dependent ecosystems both within and outside of the vegetated riparian zone (VRZ)

ACHEVING THE PARKLAND CITY Streets as a green and cool setting for public life

Based on substantial work undertaken by the Western Sydney Planning Partnership and the associated local Councils, the Western Sydney Street Design Guidelines have informed the street typologies proposed for Aerotropolis.

Proposed street profiles encourage active transport and create a green and cool setting for everyday life in the in the Western Parkland City.

GREEN STREETS AS AN INTEGRAL PART OF THE OPEN SPACE FRAMEWORK

- → Generous areas of continuous deep soil have been allowed for within the street profiles to allow for large trees to be planted.
- → Multi layered street tree canopy increases street comfort, reduces surface temperature and creates a cooler environment.
- → Continuous tree canopy provides shade to the pedestrian zone, planting areas between carriageway and pedestrian zones to increase pedestrian comfort.
- → Zones for seating and street furniture provide resting places and encourage public life under the tree canopies.

STREETSCAPE AS PART OF BLUE-GREEN GRID

- → WSUD raingardens have been embedded in the street profile design to allow for passive street tree watering whilst also removing pollutants and reducing the storm water outflow.
- → Streetscape with generous planting rich in diversity (both tree canopy and groundcover) contributes to the biodiversity within the urban fabric.

ACTIVE AND PUBLIC TRANSPORT PRIORITISED

- $\rightarrow\,$ Priority has been given to comfort of pedestrians and cyclists.
- $\rightarrow\,$ All streets can accommodate one-way cycle paths to facilitate efficient active transport
- $\rightarrow\,$ Rapid bus lanes have been proposed for selected corridors.

ACTIVE, PUBLICLY ACCESSIBLE INTERFACE WITH OPEN SPACE

→ Urban structure is oriented to the open space. Park Streets are proposed along the interface with open space to ensure public access and active interface.

MULTI-UTILITY CORRIDORS

→ Compact, multi-utility trenches below footpaths have been proposed to maximise the area of unobstructed deep soil.

GROUND PERMEABILITY

→ Proposed street typologies maximise areas of permeable (planting) and semi-permeable surfaces.



Annotations

- 1. Continuous street tree canopy
- 2. Water Sensitive Urban Design embedded in the street profile
- 3. Generous pedestrian zone under tree canopy
- 4. Active transport integral part of street profile
- 5. Tree canopy and ground cover planting rich in diversity integral part of Blue -Green system
- 6. Shared utility trenches
- 7. Ground permeability maximised consistent with Sydney Water WSUD principles

URBAN DEVELOPMENT RESPECTS LANDFORM PUBLIC DOMAIN INTERFACE



The Aerotropolis Framework



Public Domain Interface and Soil Preservation principles:

- 1. Roads and streets should as close as possible align to existing topography sloped median on steeper streets - to reduce lower embankment within properties and preserve soil B Horizon.
- Surface levels within private lots are to adjoin ground levels set by public domain as close as possible to enable active and joint interface. In industrial areas, this can be achieved by setting an office & administrative building surface level to ground level of adjoining public domain. Level difference is dealt internally within the lot.
- 3. Balance cut and fill to minimise imported soil.
- 4. Minimise incursion into soil B horizon where possible.
- 5. Surface levels within private lots to adjoin ground levels set by public domain as close as possible. Where levels varies, planted landscape batter deals with the level difference, retaining walls at the interface are to be avoided.

6. Ensure no water runoff from private lots to public domain. WSUD stormwater retention to be implemented within the lots where required.

Open Space Soil preservation and Riparian Corridor protection principles

- Streets at interface with open space should as close as possible align to existing topography to minimise impact on undisturbed soil within parklands.
- 8. Within parklands, natural soil profile is to be protected and engineered cut and fill and topographic alterations are to be avoided with the exception of localised earth works associated with sportfields, playgrounds, excavations for park amenities footings, shallow sub-bases to paths, tree planting holes and the like.
- 9. Creeks and the associated riparian zones are protected and incursion into this zone is to be avoided. Works associated with WSUD and creek restoration and small structures like paths, boardwalks, stepping stone creek crossings and the like are permitted providing the impact

is minimised and permissible with Office of Water Guidelines. Path and road structures crossings over creeks are elevated on piers to minimise the impact on the riparian zones.

URBAN TREE CANOPY PRINCIPLES AND TARGETS

UTC PRINCIPLES

- ightarrow Support the Western City DIstrict Plan overall canopy target of 40%
- → Plant as many large trees as possible as the best possible measure to mitigate heat island effect.
- A large tree will contribute much more shade over time than a small tree.
- Large tree shade in 10yrs: 60m²
- in 50 years: 200m²
- Small tree shade in 10yrs: 3m² in 50 years: 30m²
- \rightarrow Prioritise locally endemic species of the Cumberland plain.

ACHIEVING 40% URBAN CANOPY TARGET

To meet the Western City DIstrict Plan overall canopy target of 40%, the following canopy coverage is required:

- → Streets: 65-95% (varies depending on street type)
- → Parks: 60%
- → Flood & Environment zones: 60%
- → Infrastructure: 10%
- \rightarrow Lots (industrial): 15%

Mature canopy diameter defines tree spacing.

The diagrams to the right are an example of how canopy coverage of 90% can be achieved in an industrial street.

The diagrams deviate from the Western Sydney Street Design Guide in the following ways:

- cycle lane and pedestrian path are adjacent to allow maximum size of planting blister / verge / soil volume
- The guide currently only allows for medium sized trees

DEFINED TREE SIZES & SOIL VOLUMES

To achieve the UTC targets, the precincts have defined the following:

- \rightarrow Large Tree: 65-80m3 soil
- → Medium Tree: 20-40m3 soil
- → Small Tree: 5-15m3 soil

Sizes & soil volumes based on a combination of 'Landcom Street Guidelines' Andrew Morten, Arborist & City of Sydney unobstructed root volume guides.

Tree sizes deviate from those outlined in the WSSDG where the small soil volumes are the limiting factor dictating the small tree sizes.



WATER SENSITIVE URBAN DESIGN

TREATMENT TRAINS

A shortlist of stormwater management elements has been developed based upon Council preferences, stormwater volume reduction potential, ability to mimic natural flow regimes and cost effectiveness.

Consultation with Penrith and Liverpool Councils by Sydney Water has ultimately shaped the formation of preferred treatment trains for each land use zone.

The following approaches have been adopted in developing the treatment trains:

- There is a preference for regional scale biofiltration and wetland basins to be well integrated into the landscape and co-located within detention basins as appropriate
- For industrial and commercial development, on-lot measures may include a combination of robust and low maintenance elements including of rainwater tanks, biofiltration basins and proprietary filtration devices.
- Street scale WSUD measures should be avoided but biofiltration street trees may be incorporated the streetscape

STREET TREES AND APPLICATION OF WSUD OUTCOMES

Street trees are designed to be passively irrigated with street water consistent with Sydney Water guidelines.

This principle should be applied across all streets throughout the Aerotropolis precincts.





Hassell ©

ELEMENTS OF THE OPEN SPACE FRAMEWORK

The open space framework across the Aerotropolis comprises local, district and regional parks. In addition, existing creeks and drainage infrastructure provide the 'blue' to the open space 'green'. This network has a variety of characters depending on location, function and surrounding context. Those open spaces and their connections will facilitate access to connection to Country.

REGIONAL ALLUVIAL PARKLANDS ALONG WIANAMATTA AND MAJOR CREEKS

- $\rightarrow\,$ Alluvial parklands are core biodiversity and habitat corridors.
- → Active recreation and park and community amenities of a regional and district character are included outside of 1% AEP flood zone.
- → Passive, non structured recreation (like walking path and boardwalks) is incorporated in medium flood risk zone, providing impact on riparian corridor is minimised.
- → Regional active transport routes are incorporated within the parklands framework.

DISTRICT PARKLANDS ALONG TRIBUTARY (OFTEN EPHEMERAL) CREEKS

- → Waterways of Strahler Order 3 and higher will be maintained in a natural state, including the maintenance and restoration of riparian area and habitat such as fallen debris. Where a development is associated with or will affect a waterway of Strahler Order 3 or higher, rehabilitation will occur to return that waterway to a natural state to enable natural processes and functionality to be maintained.
- → Parks have sufficient width to allow for vegetated riparian corridor and pockets of passive and active recreation of a local character (fitness nodes, seating nodes, nature playgrounds, community gardens).
- → Active transport routes are incorporated within these parks.

DISTRICT / LOCAL HILLTOP PARKS

- → These parks are established on the local high points to capture the breeze and allow for long views.
- → Dependent on the size and location, sportfields, active and passive recreation and associated park amenities of a district and local character are to be found with these parks.

LOCAL URBAN PARKS AND POCKET PARKS

- → These parks are surrounded by built form and generally located within the local city core or neighbourhood centre.
- → They are associated with community and cultural amenities like libraries and serve as a "village green" for local residents and workers.
- → More "urban" in their nature, these parks can accommodate non-structured passive and active recreation, playgrounds, kick about spaces and community and park amenities of district and local character.

PROTECTING VEGETATION

- \rightarrow Protecting existing native vegetation within open space.
- → These areas will be protected and enhanced and have no negative impact on the environment.

STREETSCAPE

→ Multi layered continuous tree canopy and ground cover planting rich in diversity create a green and cool setting for everyday life.

"GATEWAY" LANDSCAPE

→ Abstracted Cumberland Plain landscape at entrances to the Parkland City from major roads, accommodated in road reservations, setback areas and open spaces.


URBAN TYPOLOGIES AND WATER PERMEABILITY

The concept of an Urban Typology has been developed as part of the 'Beyond Business as Usual' vision of the Western Parkland City. A landscape led approach integrates landscape and urban development so work together. This approach also achieves higher land use efficiencies by co locating uses such as recreational open space and conservation areas.

Urban areas will play an important role in urban cooling by ensuring there is sufficient areas of tree canopy and water to sustain the landscape. Urban Typologies are areas of urban development comprising the range of uses typical of the place.

Urban Typologies explore how development can achieve the Parkland City benchmarks of permeable area and canopy cover, at a range of scales:

- from an individual lot (or amalgamated lots);
- a super lot large enough to create a public domain of streets and public open space;
- or at a large master plan or sub precinct scale.

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It is critical to note that the typologies serve a number of purposes:

- 1. Assist in retaining water in the landscape and irrigate tree canopy and urban cooling
- 2. Contribute to the broader integrated water management system
- The typology may not fully meet all stormwater requirements on every site and other measures may also be required – like tanks etc
- 4. The great advantage of the 'Parkland' solution is that it can be adjusted to meet higher requirements without needing tanks etc. It also starts to bring the Wianamatta-South Creek spine to life
- 5. The typology is a 'tool kit' that is flexible and performance based



A large master plan or sub precinct scale

A super lot large enough to create a public domain of

streets and public open space

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An individual lot

The more land is amalgamated the more flexibility there is for development footprint:

- the public domain can work harder
- individual lot requirements can be simpler

Urban Typologies are areas net of the following areas:

- 1% AEP areas of flood
- Regional open space, playing fields
- Major infrastructure, motorways, regional roads
- Riparian areas
- Areas of high biodiversity value for conservation

This reflects a place-based approach and ensures that the environmental performance requirements are appropriate to the various development types. A one size fits all approach won't work. The Urban Typologies in the initial WSAP precincts are as follows:

- High density mixed use centre mixed use; includes commercial, retail, community, cultural, visitor, high density residential uses
- Medium density mixed use centre non-residential/ mixed use; includes some commercial, local employment, local services, medium density residential uses (only in mixed use)
- Employment Business and light industrial; Lower density business uses with or without associated warehouse, production, smaller scale warehousing, ancillary uses
- Employment Large footprint industrial; logistics, larger scale warehouses, production

The following table outlines acceptable solutions regarding water permeability to each of the urban typologies:

Urban Typology Lot Requirements			Typology Elements						
			Lot Area		Streets		Open Space		
	Site Cover	Permeability		% of Overall Area	Permeability	% of Overall Area	Permeability	% of Overall Area	Permeability
High density mixed use centre	h density ed use centre 60% 40%	400/	Basic scenario	50%	35%	35%	35%	10%	90%
		40%	Alternative/ parkland solution						
Medium density mixed use centre	50% 50%	E0%	Basic scenario	55%	50%	30%	35%	15%	90%
		50%	Alternative/ parkland solution						
Employment – business,	Employment - business,	Basic scenario	FF 9/	40%	20%	20%	4 60/	00%	
commercial and light industry	60%	40%	Alternative/ parkland solution	1 55% 4	40%	30%	30 /0	T3%	30 /0
Employment – Large footprint industrial	70%	30%	Basic scenario	65%	15%	20%	35%	15%	90%
			Alternative/ parkland solution						

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HIGH DENSITY MIXED USE CENTRE

ACCEPTABLE SOLUTION



Typology Elements	% of Typ.	Permeability
Streets	35%	35%
Open Space	20%	90%
Lots	45%	40%
Total	100%	~40%

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PARKLAND SOLUTION



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MEDIUM DENSITY MIXED USE CENTRE

ACCEPTABLE SOLUTION



Typology Elements	% of Typ.	Permeability
Streets	30%	35%
Open Space	15%	90%
Lots	55%	50%
Total	100%	~50%

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PARKLAND SOLUTION



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EMPLOYMENT - BUSINESS AND LIGHT INDUSTRIAL

ACCEPTABLE SOLUTION



Typology Elements	% of Typ.	Permeability
Streets	30%	40%
Open Space	15%	90%
Lots	55%	40%
Total	100%	~40%

PARKLAND SOLUTION



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EMPLOYMENT - LARGE FOOTPRINT INDUSTRIAL

ACCEPTABLE SOLUTION



Typology Elements	% of Typ.	Permeability
Streets	25%	40%
Open Space	15%	90%
Lots	60%	30%
Total	100%	~30%

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PARKLAND SOLUTION



Typology Elements	% of Typ.	Permeability
Streets	28%	42%
Open Space	15%	90%
Lots	57%	15%
Sub Total	100%	~40%
Blue / Green	х На	80%*
Total		~45%

PLANTING STRATEGY

Successful delivery of the landscape and planting vision is paramount to the realisation of the Parkland City.

Design Intent

Existing vegetation on site is a remnant of the broader Cumberland Plain vegetation that occupied the region pre-European settlement.

The overarching planting strategy aspiration is to preserve, restore and build upon the Cumberland Plain woodland and grassland character, that is typical for this place.

The landscape planting strategy for the project will draw upon existing remnant vegetation communities, their pattern and characteristics.

The existing landscape character of the site, its topography, its hydrology and its geomorphology will guide the proposed planting strategy, balanced with consideration for airport operations.

Remnant vegetation communities inform the planting palette

The planting palette for the riparian zones of the creek corridors and the associated floodplains will be informed by planting found within the Alluvial Woodland communities of Wianamatta, Thomsons Creek and Badgerys Creek corridors.

The following vegetation communities are currently present within the alluvial zones - River-flat Eucalypt Forest, Swamp Oak Floodplain Forest. As the floodplains transition to the hillside, the alluvial riparian woodland gently transition to grassy open woodland and grassland (Shale Plains Woodland) and grassy open forest (Shale Transition Forest) and Castlereagh Ironbark Forest; remnants of these vegetation types are fount within Badgerys Creek precinct. Closer to the ridgelines, Cumberland Plain Open Woodland is the predominant remnant planting community.

The vegetation character of scattered trees with open canopy, ground cover dominated by grasses and herbs, sometimes with layers of shrubs and/ or small trees - this will inform the planting palette for the precinct.

Protecting, enhancing and restoring existing vegetation communities

Existing native vegetation has been incorporated in the open space framework where possible and will be protected, enhanced and further reinforced through the connected landscape system.

Within the framework, native Cumberland plain open woodland and grassland vegetation community will be restored. Riparian corridors of tributary creeks within the open space will be rehabilitated and revegetated with appropriate riparian species.

Diversity and planting quantity

Maximising planting palette diversity is a key landscape outcome for the realisation of the Parkland City.

Planting diversity and quantity within alluvial zones of the key creeks will be maximised to restore the health of the creeks, increase biodiversity and strengthen resilience of the Blue Green system.

Streetscape

Streetscape is an integral component of the overall open space framework and significantly contributes to the biodiversity and blue-green system within the urban fabric.

The aspiration is to create a rich, diverse and multi layered streetscape planting, that will draw upon the native Cumberland Plain species, their pattern and characteristics.

The planting palette will be a mix of native and non native species, that are appropriate for the climate of Western Sydney and urban streetscape conditions and contribute to the planting palette richness.

The Aerotropolis Framework

Large and tall trees - the key species of Cumberland Plain - set the structure. The spacing and species selection of the street trees planting is inspired by the Cumberland Plain scattered pattern and therefore it is proposed to be alternating, intentionally planted in a nonboulevard manner.

The smaller trees, that form the lower canopy layer, provide the continuous shade for pedestrians. These trees will be a combination of native and exotic species, that are appropriate for the climate and conditions of Western Sydney.

The rich and diverse groundcover planting is built upon native grass species, herbs and low shrub layer. This is complemented by non native species to provide all year interest. Native trees, shrubs and plants from the riparian corridors form the core planting palette for the raingardens and bioretention basins.

Sustainability and Resilience

The planting strategy is developed according to water sensitive urban design (WSUD), passive watering and species with generally low water requirements are proposed. However, Wianamatta Street Trees can have higher water use to enable evapotranspiration to aide urban cooling, and to minimise storm water runoff.



Spotted Gum



Textured bark (Paperback)



Rough-barked apple



Seasonal interest (Narrow-leaved paperbark



Grasses (Kangaroo Grass)

Annotations

- 1. Large and tall trees set the structure
- 2. Smaller trees form the lower canopy layer and provide continuous shade for pedestrians.
- 3. Ground cover planting rich in diversity integral part of Blue -Green system
- 4. Water Sensitive Urban Design embedded in the street profile







Textured foliage (Casuarina)



Rushes (Knobby club rush)

MOVEMENT NETWORK Enabling an interconnected system

The overarching approach to movement across the Aerotropolis is to enable an interconnected network that provides equitable access for jobs, businesses, residents and recreation purposes. The movement network for the Aerotropolis has been coordinated by the Planning Partnership and led by Aecom, in association with the urban design teams.

WALKING AND CYCLING

A hierarchy of safe cycleways to major centres will help to identify and prioritise key projects.

1. Principal Bicycle network – highly used routes that connect to major destinations, on cycleways that are separate from motor vehicles and pedestrians

2. Local bicycle network – lower use corridors that connect to priority corridors and neighbourhood destinations within catchments

3. Quiet local streets – connecting residential destinations and local services in low traffic environments, design treatments make provision for people on bikes.

PUBLIC TRANSPORT

Transport network planning for the Aerotropolis and broader Western Parkland City establishes a clear public transport network. Metro stations are complemented by bus corridors, which provide connections to centres within and outside of the Aerotropolis.

The proposed network includes local and transit-focused streets that will connect to key centres including the Aerotropolis Core and the Airport. Rapid bus corridors will provide direct connections to Liverpool, Parramatta and Campbelltown. Direct connections will be provided from these centres to the airport, to the Aerotropolis Core and to Luddenham Road Metro Station.

ROAD NETWORK

The streets and places of the Western Parkland City will be smarter, healthier and more focused on people.

People in the Aerotropolis will be able to walk to the Metro on safe and shaded streets, enjoy frequent and direct bus services, have convenient access to schools and shops, and benefit from a comprehensive network of cycleways. To realise this vision and support the functions of the Airport and high-tech sector, a network of smart motorways and arterial roads will efficiently accommodate time sensitive freight and private vehicle trips.

Planning for different movements considers local networks that passthrough centres and that link places where people want to go, as well as freight and bypass networks to bypass centres and directly link people and goods to the wider network.

FREIGHT NETWORK

The strategic freight network includes the most significant corridors that support the movement of goods. Key freight links will serve the Airport to support economic activities along Eastern (Airport) Ring Road. The upgrade of The Northern Road is designed to serve the Agribusiness Precinct and the Airport Freight and Logistic Precinct. The proposed M12 Motorway will be the major access route to the Airport and connect to Sydney's motorway network.

The Aerotropolis Framework



STREET TYPOLOGIES

Street types below those of a motorway and arterial classification across the Aerotropolis are founded on the Western Sydney Street Design Guidelines. These have been adapted to suit place based requirements for each precinct.

ARTERIAL ROADS

Transport for NSW has undertaken substantial work to consider regional and district movement requirements, including freight and rapid bus transit. The Western Sydney Street Guidelines do not apply to arterial roads, and so engagement with Transport for NSW has occurred in order to understand road and intersection requirements, relationships to non-car based travel and implementing utility corridors. The 60 metre, 45 metre and 40 metre road sections describe the arterial road environments throughout the Aerotropolis.

WESTERN SYDNEY STREET GUIDELINES

These guidelines address complexities of movement and vehicle types along with stormwater, urban heat island impacts, water sensitive urban design and creating comfortable and attractive places.

Precinct Wide Street Types	
Primary arterial road	60 metres
Primary arterial road (rapid bus)	45 metres
Sub-arterial	40 metres
Collector	25 metres
Local Street *	25 metres
Park Edge Street	23 metres
Riparian Street	19 metres + Riparian Corridor Width
	18 metres + Riparian Corridor Width

Service Street

9 metres

Note: A wide variety of local street sections have been provided in the urban design report for guidance and can be used differentially dependent on context. The objectives of the guidelines have been incorporated into associated streets across the Aerotropolis:

- → Streets encourage social activation through their design
- → Streets are self-explaining slow environments that are safe and comfortable for all users
- → Streets are inclusive with footpaths on both sides
- → Streets are safe for cycling, with separated bicycle facilities on busy streets
- → Continuous canopy cover is achieved on both sides of every street
- → Water sensitive urban design is integrated into every street
- → Carriageway widths are designed to maximise space for alternate uses and users
- → Ensure future transport solutions maximise place outcomes for streets

The street section typologies across the Aerotropolis take the general approaches in the guidelines but adapt them based on place specific and precinct outcomes, particularly to apply landscape led urban design principles and recommendations from TfNSW - active and public transport. Carriageway widths are consistent, but verge areas and some configurations vary according to:

- → All streets can accommodate bus routes
- → All streets can accommodate separated bicycle lanes to promote active transport.
- → More generous footpath width proposed for pedestrian comfort.
- → More generous verge areas proposed to ensure sufficient soil volumes of deep soil are provided to enable planting of large street trees.

The Aerotropolis Framework



60 metre arterial Freight functionality



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45 metre arterial **Rapid bus corridor** 2.5 5 25 THEE ACTIVE PLEXERS LAVE PLEX MAND Shàred Otility Trench Shared Otility Trench Shared Otility Trench Shared Utility Trench Elsholz kerb with inlets Elshoiz erb with inlets Elsholz eerb with inlets Elsholz arb with inlets 9 60 2m 3m 2.5m 1.5m **1**m 2m 1.5m 3.5m 3.5m 3.5m 1.5m 2.5m 3m 3.5m 3m 1m 2.5m Planting zone Rain garden Bus stop Travel la Pedestrian Planting zone One-way Sł Rain garden Bus stop Planting zone One-way cyclepath Planting zone Pedestria Planting zo 2m min 2m min 6m 2.5m min 2m 2.5m min 0m 5m Planting zone at Bus stop Pla Bus stop ting zone 12m 23m Carriagewa 45m 10m



40 metre sub - arterial kerbside bus lane Intersection: £=7 3 6 25 25 5 3 35 - s + 3.5m Turning la Shared Utilities Trench Elsholz kerb with inlets Shared Utilities Trench Sydney Water Elsholz kerb with inlets 5 9 Planting zone 2m 3m 3.5m 3.5m 3.5m 1m 2m 2.5r 2.5m 1m 3.5m 5m 2m 2m Ы Planting zone, Bus stop edestria Planting One-way Travel lane/bus lane Travel lane Rain ga den/ Planted med Tra Planting zo Bus stor One-way cyclepath Planting zone Pedestri 2.5m min 3m min 2.5m <5m 5m 3m Sydney Wa 10.5m Utilities 10.5m Planting zone Planting zone Planting zone Planting zor 19m Carriagew 40m



Western Sydney Aerotropolis Urban Design and Landscape Plan Report

0m 2m 4m





Western Sydney Aerotropolis Urban Design and Landscape Plan Report

25 metre local street (high street - commercial centre)







Western Sydney Aerotropolis Urban Design and Landscape Plan Report

25 metre local street (mixed use residential)





Western Sydney Aerotropolis Urban Design and Landscape Plan Report

23 metre park edge street





Western Sydney Aerotropolis Urban Design and Landscape Plan Report

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13 metre local street crossing open space

Note: Where local streets are required to traverse a park setting, this cross section can be used to diminish the width of the road reserve.









25 metre industrial street





Western Sydney Aerotropolis Urban Design and Landscape Plan Report



Riparian Street (19m+Riparian Corridor Width) **Mixed Use Zone** Slotted keefb / keefb with inlets than 1:4 to 2.2n 24% Powed Acea 11 47% Perm 2 29% 🛎 **A** 74% roperty B 閟 6.4m ar Park

Western Sydney Aerotropolis Urban Design and Landscape Plan Report

*varies

*Varies % Inner Area of R *Varies 2% Inner Area of Bir

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3.2m Planting zone/ furniture zone

2.2

3.6m min

6.6m mir

Riparian Street (18m+Riparian Corridor Width)



THE CENTRES FRAMEWORK

CENTRE FRAMEWORK SPATIAL PRINCIPLES

- 1. Distribute centres to support the 30 minute city
- 30 minutes by public and/or active transport to employment
- 30 minute walkable / active / public transport networks support local neighbourhoods.
- 2. Provide a centre or point of focus at the heart of all neighbourhoods
- Centre locations must take account of the barrier impacts of major roads.
- Centres will vary in size, role and type based on their catchment.
- 3. Provide a hierarchy of centres linked to active and public transport
- Centres are located to be associated with a public transport service
- Higher order centres are provided with a Metro station
- All centres are located on the inter-connected active transport network

- 4. Ensure density and catchment is prioritised in higher order centres
- Metropolitan and strategic centres are of the highest order
- 5. Locate centres in areas of high amenity
- Centres will help activate parkland corridors
- Centres are located to link public transport to open space

Metropolitan centre – A Metropolitan Cluster or Aerotropolis Centre acts as a regional-scale mixeduse centre focusing on retail, services and business activity, serviced by a metro station.

Specialised centre/precinct – strategic innovation and focused on an employment regenerator or theme - and contains a metro station. Local centre – local convenience and a mix of uses, but does not have to include residential. Smaller scale and more local convenience

Neighbourhood centre – the District plan refers to employment activity hub or indigenous business hub. In the enterprise zone this could be a hub of business, with community facilities.
The Aerotropolis Framework



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Hierarchy of centre	Role and Intent	Typical uses	Transport connectivity	Critical criteria
A Metropolitan Cluster or Aerotropolis Centre acts as a regional-scale mixed-use centre focusing on retail, services and business activity. Type: Aerotropolis City Centre	An Aerotropolis Centre is the centre of the Parkland Western Sydney Metropolitan Cluster and includes multi use purposes for a diversity of uses and a full range of community uses: - Commercial office development - Employment opportunities - Multiple supermarkets and department stores - Higher-order services	Business, commercial, office, shop top housing, retail, health, education, tourism, hotels, community facilities and recreation	Located central to the train station, and includes a bus interchange	Located around metro/ mass transit nodes and highly accessible areas Part of a mixed use precinct In close proximity to the regional park. Initially focused from the metro to Thompsons Creek, centre activity will extend east of Thompsons Creek over time as intensity increases.
	 Health and Education services Creative and cultural uses 			
Strategic centre for the broader regional area to support the 30-minute city	Provides the centre for the 30 minute city, particularly for jobs in the region and core strategic services and	Major business, commercial, office, shop top housing, retail, and community facilities, and	High levels of public and active transport accessibility, particularly a train station.	To provide a mix of land uses supported by Metro/mass transit or interchanges
Туре:	includes:	higher order services.		Provide high levels of
Leppington	 Commercial office development Employment opportunities Multiple retail, supermarkets and bulky goods Higher-order services 			amenity, accessibility
Specialised centre/precinct	Strategic innovation centre and focused on an employment generator	Business, office, industrial, employment focus with a specialised focus e.g.	High levels of public and active transport accessibility and	To provide a specialised land use focus, whether health and education or
Type: Sydney Science Park	or theme - this could be Sydney Science Park, or	agribusiness, defence, aerospace, health and	connectivity to green corridors	aerospace and defence as an agglomeration of
	perhaps a future centre in the Agribusiness or defence and Aerospace and defines strategic centre.	education A broad range of specialty retail		uses, supported by other mix of uses, including residential to create a living population.
		A concentration of social infrastructure		
	They are a focal point where they include public transport and transport interchanges, they are an important part of a 30-minute city. While they are diverse and vary in size, they provide access to day to-day goods and services close to where people work in the Aerotropolis. They do not need to provide residential accommodation.	District level commercial and business uses supporting light industry Residential uses as shop top housing or multiple dwellings to support the employment uses.		

Hierarchy of centre	Role and Intent	Typical uses	Transport connectivity	Critical criteria
Local Centres Type: Badgery's Creek, Northern Gateway Aerotropolis Core Luddenham Village *	Local Centres are smaller retail centres, approximately 1.5km apart, which meet the convenience retailing needs of the community which it serves, whilst acting as a local gathering place, particularly for employers/employees. They include local convenience and a mix of uses, but does not have to include residential in the Aerotropolis. Smaller scale and more local convenience and provide a place making opportunity for local communities and surrounding workers. Local centres protect or expand employment opportunities, and integrate and support creative enterprise Local centres are in areas of high amenity to help activate parkland corridors	A supermarket or large grocery store Retail facilities and specialty shops, personal services and some commercial floor space Co-location and increased provision with social infrastructure (community facilities & open space) Smaller scale mix of uses supporting industrial, office and employment uses Luddenham Village: Additional residential development to be provided in Luddenham Village to support the centre's ongoing viability.	Active transport infrastructure which supports frequent trips to access goods and services within and between centres. Active transport connections to green corridors. High level of pedestrian accessibility from surrounding development, Provision of bus access, drop off points and car parking between buildings and the street	Located adjacent to areas of open space for activation purposes. Ideally located on a frequent public transport spine.
Neighbourhood Centres or business hubs Type: Badgerys Creek Northern Gateway Aerotropolis Core	 and link to public transport. Neighbourhood Centres provide daily convenience goods and small range of services to support workers and include: A small amount of retail floor space (not a supermarket, large grocery store or significant specialised retail) Multiple retail premises (not just a petrol station or one stand-alone store) An activity hub or Indigenous business hub, with business and or recreation facilities, or with community facilities to support the employees and workers Does not include residential uses. Location must take into account the barrier 	Local convenience shops Local professional services Local office and business uses normally adjacent to open space or amenity areas to co-locate	Focus for bus network High level of pedestrian accessibility from surrounding development, Provision of bus access, drop off points	Located adjacent to areas of open space for activation purposes. Ideally located on a frequent public transport spine. Locations in the centre hierarchy plan are indicative.
	into account the barrier impacts of major roads and different sizes			

SUSTAINABILITY

As informed by Alluvium and Mosaic Insights

Sustainable - regenerative development (sometimes called 'regenerative sustainability') is the new frontier for city and precinct design, supporting cyclical resource flows (circular economy) and striving to achieve a net positive ecological, social and economic impact. This concept has grown out of the original sustainability movement which had its origins in the latter part of the last century.

Sustainability for the Western Sydney Aerotropolis is when the planning design delivery and operation of its precincts supports cyclical resource flows and strives for a net positive outcomes on all scales and by all parties across ecological, social and economic sectors.

A fundamental principle of regenerative development is that it is based on an understanding of, and response to, local place and ecosystem.

This resonates strongly with the Aerotropolis vision to 'respect and connect Country' and the landscapeled approach. The Aerotropolis can be an exemplar, showcasing how urban developments can build in long-term resilience to the effects of climate change. While the conventional approach to sustainable development is focused on minimising adverse outcomes, regenerative development targets 'net positive' outcomes and supports cyclical resource flows. Regenerative goals may seem ambitious and challenging in today's context, but they are a necessary path towards resilient, thriving cities and suburbs.

As a significant new land release, Aerotropolis provides an effective opportunity to lock in the principles and foundations of regenerative development. While some outcomes may not be achievable upfront, the transition can be modelled and planned for (for example, transition to a carbon positive precinct by 2050).

A WATER SENSITIVE AEROTROPOLIS

- Water is supplied as a priority from within the catchment (rain and stormwater then recycled water) for non potable uses
- Co-governance / compliance arrangements are put in place to share water across property boundaries
- Fit for purpose water use for all residential, landscape, commercial and industrial uses.
- Third pipe for harvested stormwater or recycled wastewater is available to all residential, landscape commercial and industrial uses
- Green infrastructure (WSUD) is integrated into built and natural environments
- Green infrastructure to provides water treatment, urban cooling, ecosystem services and amenity
- WSA is designed as a sponge to increase perviousness significantly
- Landscapes adversely impacted by contaminated soils and salinity are actively managed and restored
- Rainwater is captured at a range of scales – lot, neighbourhood, regional
- Raingardens and wetlands are interspersed throughout the built environment and landscape
- Vegetation/trees in the public and private domain is supported by soil volumes and passive irrigation
- Tree canopy targets are met at the neighbourhood scale

A ZERO WASTE AND CIRCULAR ECONOMY AEROTROPOLIS

- Adopt principles of AVOID first, REDUCE, REUSE, RECYCLE last in material choices and construction methods
- Educate and embed behaviours, practices and systems through adoption of Sustainability / Resilience Framework and planning controls, services and information and education – individuals and businesses
- Design out waste in supply chain and manufacturing and eliminate single use items:
 - by using design guides for buildings with prefabricated/ modular, long life and loose fit, flexible and adaptable solutions
 - adaptable and reusable infrastructure - temporary facilities that can be remodelled as the WSA grows/changes
 - eliminate construction waste with programs with volume builders to encourage waste minimisation in building design
 - use of recycled and renewable materials

- Establish Circular Economy Hubs for innovation and including Resources Recovery Processing infrastructure
 - plan now to process materials locally establishing local economies and circular systems within the Aerotropolis and on the boundary with Western Sydney councils
 - match suppliers with the local markets
 - testing innovative construction approaches - link with new CRC
- Provide processing and treatment facilities at a range of scales
 - lot, neighbourhood, regional
- basement processing, microfactories, large scale processing and
- Establish network based drop off points in preference of door to door collection.

A LOW CARBON AEROTROPOLIS

- Plan for greater than 100% renewable energy supply to make WSA a net exporter of clean energy to the NSW grid.
- Include diversity of renewable energy supply including solar, wind, green hydrogen, and bio-energy (anaerobic digestion of organic waste)
- Provide decentralised local generation and supply
- Develop integrated systems for energy generation – waste and water
- Develop multi modal transport system that prioritises walking and cycling in the 30-minute city
- Promote pedestrian and cycling network
- Design and regulate for greening Infrastructure in public realm and private spaces for cooling, shade, amenity
- Implement in the Street Design Guidelines the transition from individual use of infrastructure such as on and off road to shared adaptive infrastructure
- Adaptable infrastructure for Charging stations – public facilities transition to private charging
- Design roof space for energy generation, open space and amenity, gardens, food production, water harvesting, urban cooling

- Provide space for local food production and distribution / retail / sharing - via markets, community gardens on public land and private spaces - lot, neighbourhood and regional scale
- Create equity of access to solar or renewables - removal of barriers to solar or renewables - Cost, rentals, heritage, solar access
- Establish circular economy markets to reduce waste and transport emissions
- Distributed and diverse share economy facilities and libraries

A COOL AND GREEN AEROTROPOLIS

- Green infrastructure
 - Vegetation providing (evapotranspiration, shade from large trees)
 - Water providing (evaporative cooling through misting and irrigation breezes over water bodies, healthy vegetation, green roofs, walls and facades providing shade, insulation and evapotranspiration
 - Design of places providing air flow, green open space and appropriate building morphology so that the cooling from green space can be harnessed and spread throughout the city, e.g. having green open space upwind of the area of interest.

- Built environment
 - Highly reflective building materials to minimise light and heat absorbtion
 - Shade through eaves and overhangs, awnings
 - Permeable pavements
 - Street tree pits redesigned for deep soils and passive irrigation
 - Passive irrigation of vegetation to increase evapo-transpiration
 - Adequate vegetation around buildings
 - Natural ventilation and passive solar design to built form
 - Solar panels for shading

STAGING AND SEQUENCING

ALIGNING STATE INVESTMENTS

The Initial Precincts are the first stage precincts to be developed in the Aerotropolis. Sequencing within the Initial Precincts provide the priorities across infrastructure development and to align Government investment with achieving targets established in the Western Sydney Aerotropolis Plan.

Staging and sequencing across the Aerotropolis has been informed by the Place Infrastructure Compact (PIC) work which has been undertaken by the Greater Sydney Commission in conjunction with infrastructure and service delivery agencies within government. The PIC process was established to better communicate priorities across infrastructure development. The Aerotropolis PIC will provide more detailed timing of infrastructure.

Sequencing of the Initial Precincts is based on the following criteria:

- → Tri-level government Western Sydney City Deal commitments
- ightarrow Job creation potential
- → focus on and around the new Metro Stations to support the new public transport
- → leverage the M12, Northern Road and associated access to the airport and Elizabeth Drive upgrades
- \rightarrow Government priority areas within the Aerotropolis Core
- → Leveraging off investment ready large land holdings
- → Support for focused centres in the agribusiness precinct –

- Luddenham Village and Agriport → Infrastructure utility investment extending from existing infrastructure
- → Acknowledging environmental constraints.

KEY REQUIREMENTS FOR SEQUENCING OF DEVELOPMENT AND INFRASTRUCTURE

- 1. Development does not compromise the orderly provision and staging of the transport network, utilities and servicing.
- 2. Early development prioritises/ leverages off locations with mass transit capacity and is well supported by high levels of public and active transport accessibility.
- 3. Development does not result in isolated areas requiring out of sequence servicing by transport networks, utilities and services.
- 4. New roads provided as part of new development are integrated with any proposed local and regional road network and does not result in isolated and poorly connected road sections.

Three broad sequencing of the precincts are proposed. The NSW Government supports the sequencing within the precincts to generally occur in the manner as outlined.

AEROTROPOLIS PRIORITIES

The first areas of priority are:

- → High density employment areas within walking/ active transport distance from committed Metro Stations at Luddenham and Aerotropolis Core
- → Associated large unfragmented landholdings
- → Land adjacent and outside of the M12 corridor and interchange area that can support access to the Western Sydney International (Nancy-Bird Walton) Airport
- → Agribusiness land in the northern area enabling access to the Western Sydney International (Nancy-Bird Walton) Airport from The Northern Road.
- → Agribusiness land in the southern area that links to Northern Road and airport entry

The second areas of priority are:

- → Mixed use zoned land east of Thompsons Creek in relatively close proximity to the Metro and Aerotropolis Core Centre that can bolster employment and resident populations
- → Connecting developed areas between the Aerotropolis Core, Badgerys Creek and Northern Gateway precincts.
- → Land to the immediate west of Badgerys Creek Road

The third areas of priority are:

→ Land that is further from either committed infrastructure and / or more difficult to develop owing to environmental and topographical constraints

The Aerotropolis Framework



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