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NORTHERN GATEWAY URBAN DESIGN AND LANDSCAPE REPORT

DRAFT - for public comment
October 2020

Prepared for
Western Sydney Planning Partnership

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This report has been prepared for:

WESTERN SYDNEY
PLANNING
PARTNERSHIP



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PART 4: THE PRECINCT PLAN

The Aerotropolis precinct plans establish a pathway for landscape-led design outcomes. Country, water and parkland frame dense urban neighbourhoods and other employment lands, where a sustainable city model will emerge over the next forty years.



Aerial view from the north

NORTHERN GATEWAY PRECINCT PLAN

The Northern Gateway Precinct Plan is an ambitious urban project that will guide for decades to come the development of this strategic 1,616 hectare new piece of metropolitan Sydney. Along with the Aerotropolis Core, Badgerys Creek and Wianamatta-South Creek Precincts adjoining to the east, and Agribusiness Precinct connecting to the west, these major precincts will develop relationships of reciprocal benefits with the new Western Sydney International (Nancy-Bird Walton) Airport that stands in the centre. The scale of this coordinated planning has never been attempted in Sydney before.

The Northern Gateway Precinct is to the immediate north of the major entry to the airport itself. It adjoins to Wianamatta-South Creek to the West, Agribusiness to the south and is also bounded by the future North Luddenham precinct to the West. Currently it has only one major road through it. The Precinct will provide important links north into the greater Penrith area via the major transport infrastructure of the metro, motorway, freight, main road, strategic bus way and cycleway connections. The precinct will become a hub for manufacturing, warehouse and distribution functions, while the inclusion of a new metro station in the proposed Science Park will offer scope to create a vibrant and well-connected mixed use strategic centre.

Landscape and interpreting connection to country are crucial considerations in the layout. Relating to the site's unique topography, increasing urban tree canopy, improving infiltration and water treatment are at the heart of the plan. The creek lines, with their remnant vegetation, potential archaeology and flood capacity roles, will be protected and form the primary Green Grid across the precinct and connecting to the adjoining areas. The conical hilltops in the south west of the precinct will also be protected, designated as future parks. These parks will enjoy a panoramic outlook across the precinct, southwards to the expanse of the airport itself, and west to the nearby Blue Mountains.

The connective, distributed street system will create a new generous and environmentally-attuned public space framework. The primary street grid follows the alignments of the historic Luddenham Road and Cosgroves Creek to its east. This grid is skewed to the topography, allowing the streets to have right angled intersections with both the creek and main road frontages. A sister street parallel to Luddenham Road is located 800 metres to its west, creating a connective and relatively level traverse of the precinct.

The street layout is fully integrated with extensive parklands, as all parks will have defined public frontages. Most streets will have open vistas to

parklands and beyond to the broader landscape. The generous street sections will provide ample space for a tree canopy to develop, and for innovative water management. Together the streets and parks will lead the implementation of sustainable green infrastructure, and will provide essential walking and cycling links across the territory.

Over time the Northern Gateway Precinct will develop as a support precinct for the airport, with jobs in warehousing and distribution, and manufacturing. The proposed Science Park, which benefits from the new metro station and the rapid bus network, can provide a higher density centre and specialist employment and mixed use opportunities. Local centres are distributed across the precinct, giving the opportunity for some retail mixed with social uses such as clubs and community buildings.



View towards the specialised centre. A connective green network of streets with generous tree canopy.

URBAN DESIGN FRAMEWORK

The structure of the landscape is key to generating the urban form of the precinct plan. The alignment of existing creeks and significant riparian floodplains, the conical hills and natural vegetation have been fundamental in determining the alignment of the street network and the block structure. The significant riparian floodplains are framed and addressed by continuous edge streets, while the perpendicular streets all terminate with open vistas to the landscape and open sky. As a result the urban form is calibrated to and celebrates the rolling topography of the Western Sydney landscape.

The Precinct Plan's structure also draws its inspiration from the existing alignment and character of Luddenham Road, creating a

complementary paired 'sister' street to Luddenham on the slopes west of the ridgeline. Between these two primary structuring streets is a robust north-east oriented grid which forms efficient rectilinear blocks that optimises use of the gentler terrain for development, deforming rationally around hilltops and creek lines to form a coherent public domain network

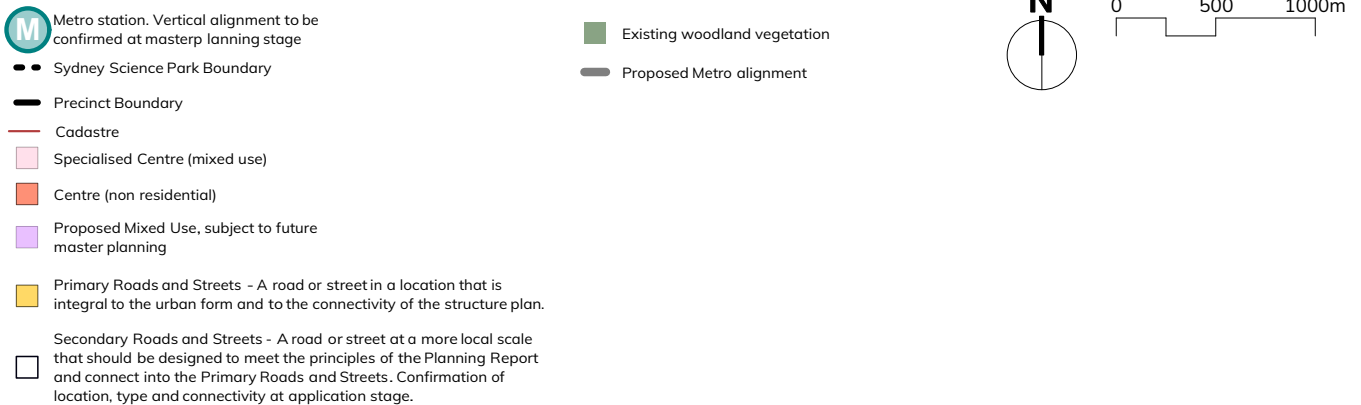
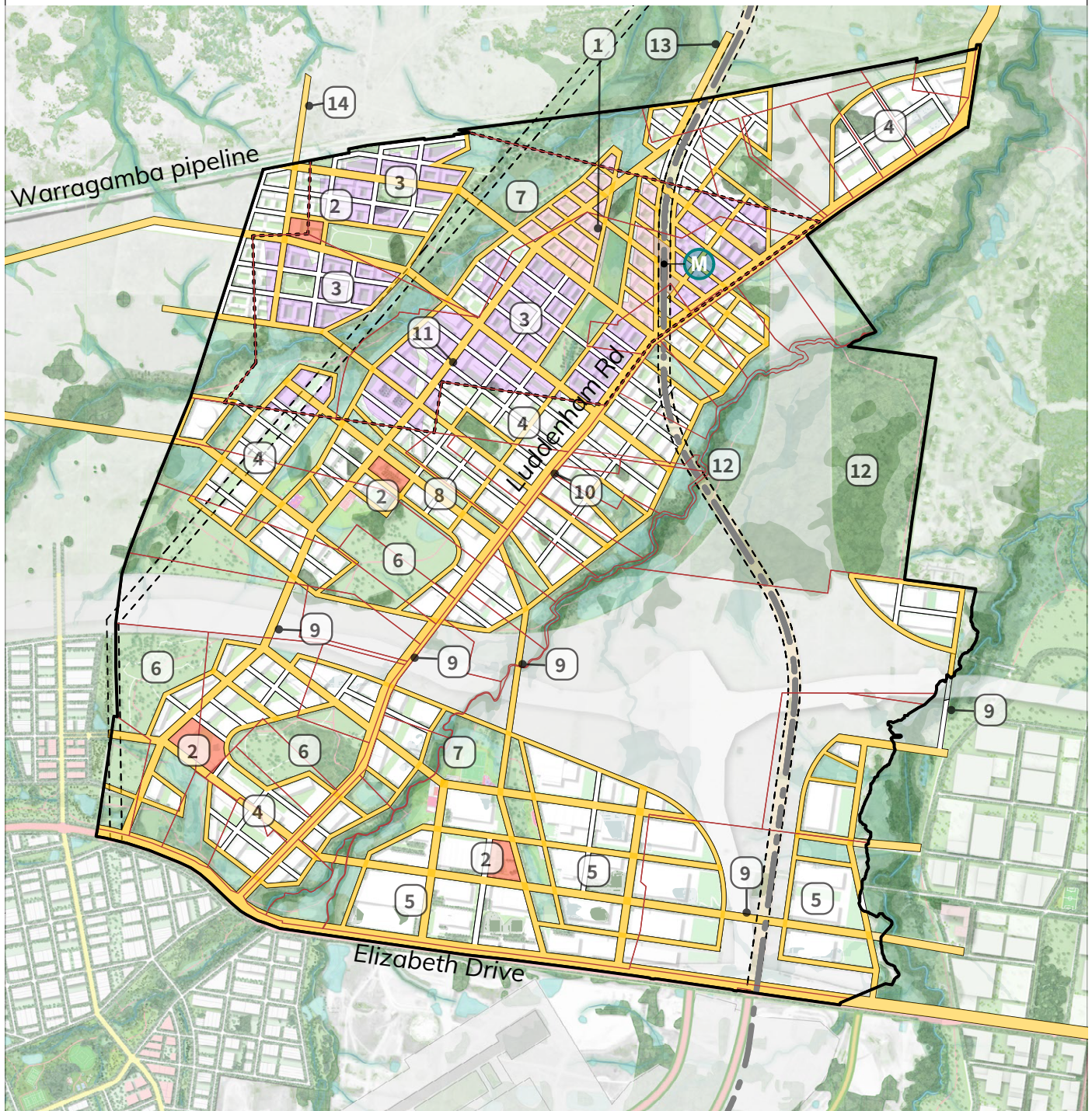
Where ground is flattest in the south adjacent to the airport, the street and block structure broadens to make larger sites available for logistics and large format uses. Where the terrain rolls more in the centre and north of the precinct the street and block structure reflects a greater density of smaller footprint building types tailored to the terrain.

In the north and to the west of Luddenham Road, a Specialised Centre is established within the approved Sydney Science Park boundary and around the new Metro station, with commercial buildings and housing to assist with activation. Its layout of the street network is designed to allow residents, workers and visitors to orient themselves directly to significant local and regional open space in the west.

The addition of a new Metro station will further catalyse the Precinct and provide for new opportunities for connectivity throughout the broader Precinct.

Annotations

1. Specialised Centre. A hub with focus on innovation, science, technology as well as other mix of uses such as housing. Contains Metro station. Integrated with the creek parkland
2. Local centre, each with its own focus and amenity (non-residential).
3. Mixed used zoning to support the strategic centre and other enterprise areas throughout the precinct.
4. Finer grain employment area with smaller building types on steeper land. Lot sizes are smaller to minimise extent of cut and fill associated with larger scale building typologies.
5. Larger scale employment area located on flatter parts of the precinct. These areas will accommodate larger block typologies.
6. Hilltop parks retained as key features. They provide connection to Country by providing creek to hilltop connections,
7. Riparian Parks/creeks, open space and existing woodland retained. In lower risk flood zones these areas contain active recreation and a range of shared passive open spaces.
8. Creek to creek connection with linear park provide active recreation and a range of shared passive open spaces up valleys and connecting development over the ridge line.
9. Critical connections across major infrastructure corridors. The M12, and planned OSO corridors disconnect the precinct into alienated fragments of land. In order to achieve minimum walkability and connectivity throughout the precinct, active and vehicular crossings are proposed over and under these corridors.
10. Luddenham Road. This is the primary
11. Paired street to Luddenham Road. This is a major structuring spine and will serve as a main frequent bus and active transport corridor.
12. Remnant woodland becomes conservation area.
13. Potential strategic crossing over the Warragamba Pipeline to improve connectivity to the Greater Penrith to Eastern Creek (GPEC) investigation area. New road bends slightly to cross pipeline next to Metro line. This would also serve as an active crossing.
14. Potential for another strategic crossing over the pipeline to further improve connectivity of the Aerotropolis with the GPEC area.



OPPORTUNITIES AND CHALLENGES

INFRASTRUCTURE

Challenge

- The planned M12,M9 and OSO corridor cuts through the precinct alienating large areas of the site.
- Connectivity between these segregated areas is key to a sustainable urban development

Opportunities

- Create enlivened urban environments and open space utilising infrastructure

URBAN CAPABLE LAND

Challenge

- The proposed M12,M9 and OSO corridor cuts through the precinct alienating large areas of the site.
- Connectivity between isolated areas is key to a functioning urban environment and future growth.

SALINITY

Challenge

- Managing areas with high soil salinity on steeper topography

Opportunities

- Restore existing vegetation to improve salinity with a landscape-led approach.

SHADING BUILDINGS

Challenge

- Shading buildings on sloped sites and provision of adequate tree canopy

Opportunities

- Develop a new approach providing deep soil and canopy within public space to ensure 40% tree coverage and shading of buildings

LUDDENHAM ROAD

Challenge

- Retain the connection to country, existing trees and adapt sensitively the rural character of Luddenham Road to create a tree lined boulevard.

TOPOGRAPHY

Challenge

- The Northern Gateway is characterised by undulating topography and steep hills in parts.
- The majority of the precinct is zoned enterprise and the majority of development envisaged is medium to larger scale industrial developments.
- The topography will be a challenge as these types of developments are more suited to flatter areas.
- A new approach to this typology is needed rather than the business as usual approach of levelling out sites and building large retaining walls to deal with level change.

Opportunities

- Celebrate the hilltops and ridges, connect with country and repair the Cumberland Woodland, celebrating endemic species.

THE GPEC AND BROADER WESTERN SYDNEY CONTEXT

Opportunities

- A major opportunity exist to connect the Northern Gateway and the Aerotropolis precinct to wider Western Sydney

Challenge

- Warragamba Pipeline

SYDNEY SCIENCE PARK

Challenges

- The existing planning approval for the Sydney Science Park has been in place since 2016, prior to confirmation of a Metro station and comprehensive precinct planning

Opportunities

- Integrate Sydney Science Park as a key part of the whole Northern Gateway Precinct
- Leverage off the Metro Station to create a vibrant mixed use quarter
- Diversify and intensify land uses to increase employment opportunities.

- Provide catalyst for the development of the whole Northern Gateway area.
- Create a public space network of streets and parklands that seamlessly connects to the wider Northern Gateway Precinct.

Statutory Context

- There is an approved master plan for the site as indicated on the adjacent plan. It complies with the current Penrith City Council DCP and LEP.
- In the light of recent announcements and planning investigations for the Aerotropolis, a planning proposal or masterplan for the site can be submitted and assessed under the WSA SEPP, the Precinct Plan, WSA Stage 2 DCP and the Master Plan Guidelines.

Ensure precinct specific principles are met

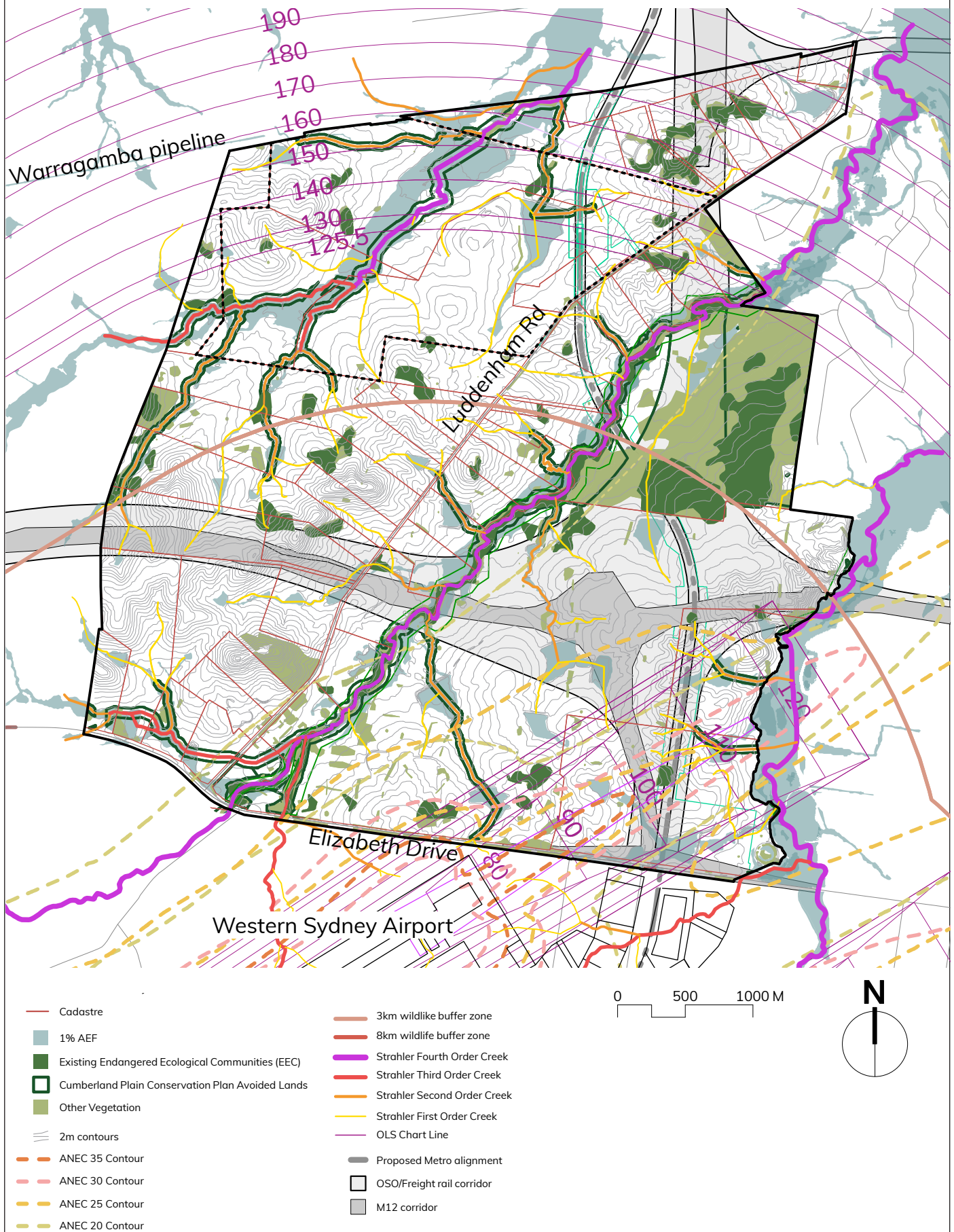
- Review the plans in view of a landscape-led approach that considers connection to country, orienting urban development to creek spines, in close proximity to confirmed major public transport.
- Consider plans in the light of recently confirmed Metro, public and active and transport framework is to deliver sustainable transport
- Adapt existing plans to the transport hierarchy, incorporating the metro corridor, allowing for the widening of Luddenham Road and creation of connective bus routes through the area
- Provide for excellent spatial connectivity within and between precincts in line with the Blue-Green grid

AIRPORT CONSTRAINTS

Challenges

- Given the precinct's location to the airport, there are constraints associated with noise and building height limitations associated with the OLS. Parts of this precinct are in ANEF contours 20 or greater which will limit the types of land use within the southern portion of the site.

Existing Constraints



Existing Character



Rural character of Luddenham Road



Steep hills



Cumberland Plain woodland



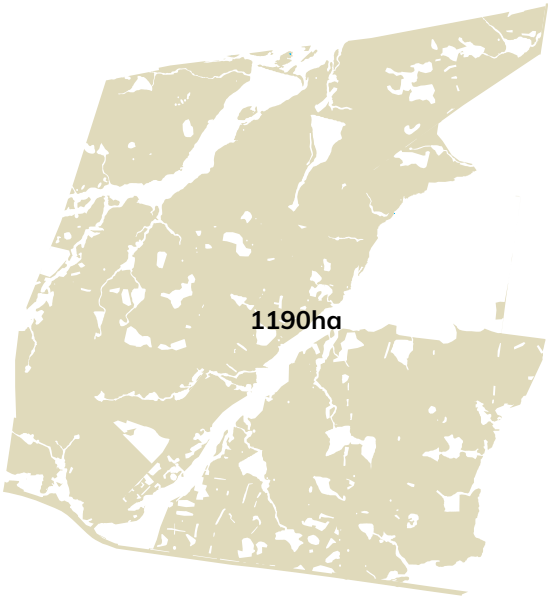
Undulating topography

Images:
Photographs showing scenes throughout the Northern Gateway precinct.

Urban Capable Land Calculation Deducting Constraints

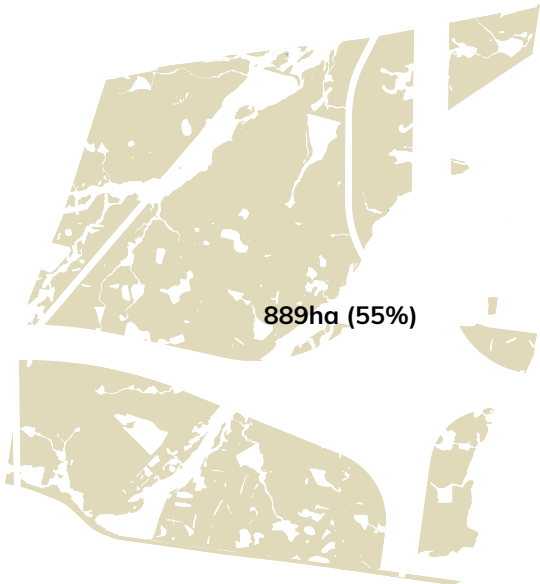


SITE AREA 1616ha



SITE AREA 1616ha

- CONSTRAINTS:**
- 229 ha exist.woodland = 14%
 - 224 ha flood (1 in 100) = 14%
 - 19 ha exist. environmental protection zone = 1%

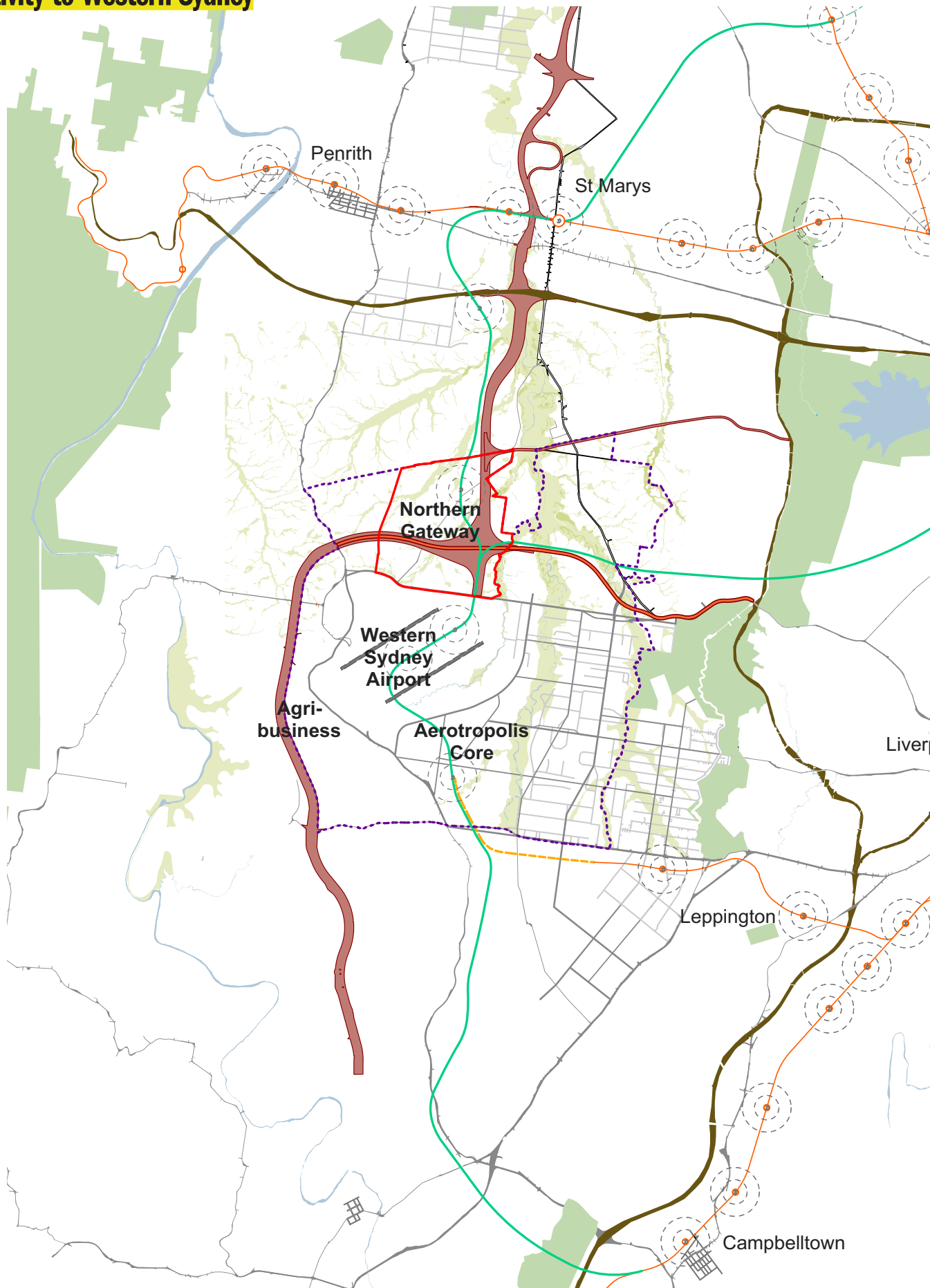


SITE AREA 1616ha

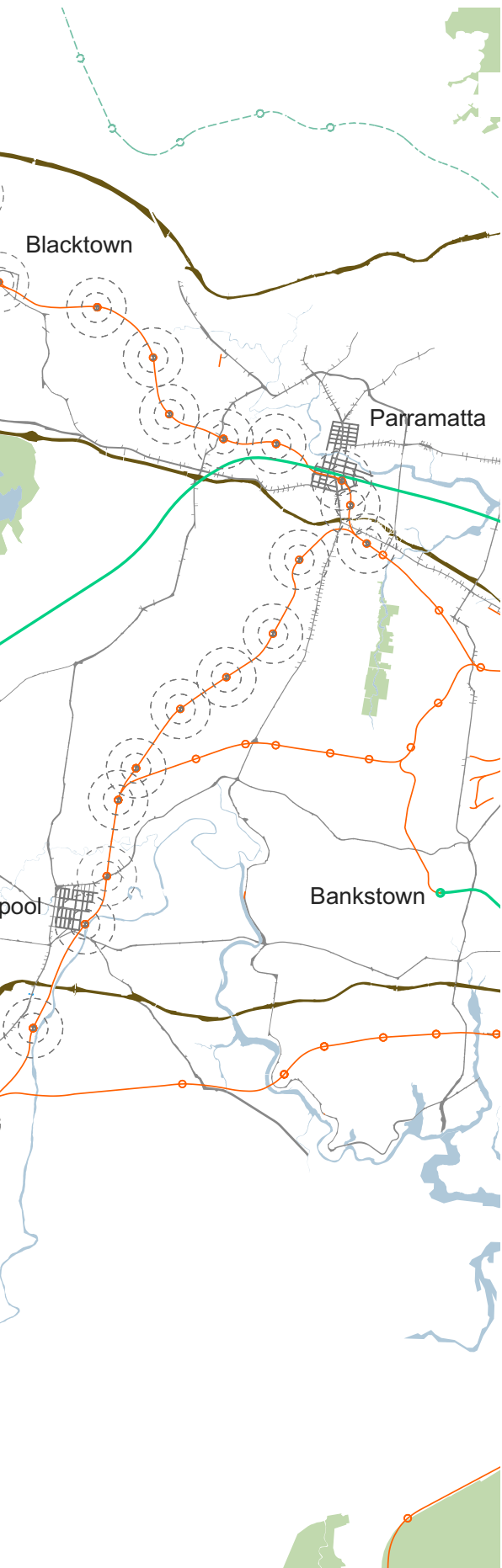
- CONSTRAINTS:**
- 229 ha exist.woodland = 14%
 - 224ha flood (1 in 100) = 14%
 - 19 ha exist. environmental protection zone = 1%
 - 417ha proposed infrastructure = 26%

DEVELOPABLE AREA 889ha

Connectivity to Western Sydney



WESTERN SYDNEY SITUATION

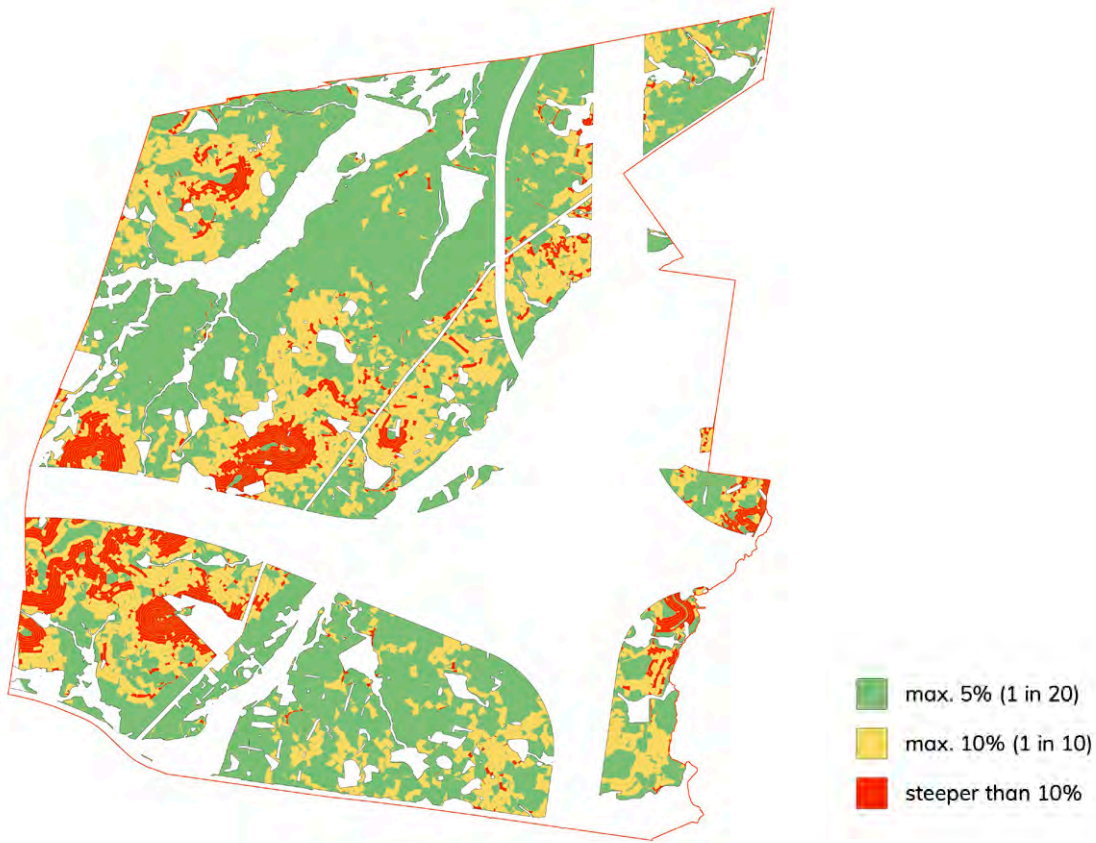


- Legend
- Aerotropolis Boundary
 - Northern Gateway Precinct Area
 - Existing Rail Line
 - Future rail + metro lines
 - 400m+800m station walking radii
 - Existing motorway
 - planned M12 alignment
 - WSC Corridors (2018)
 - Town centre / city centre grid
 - Parklands - National and Western Sydney

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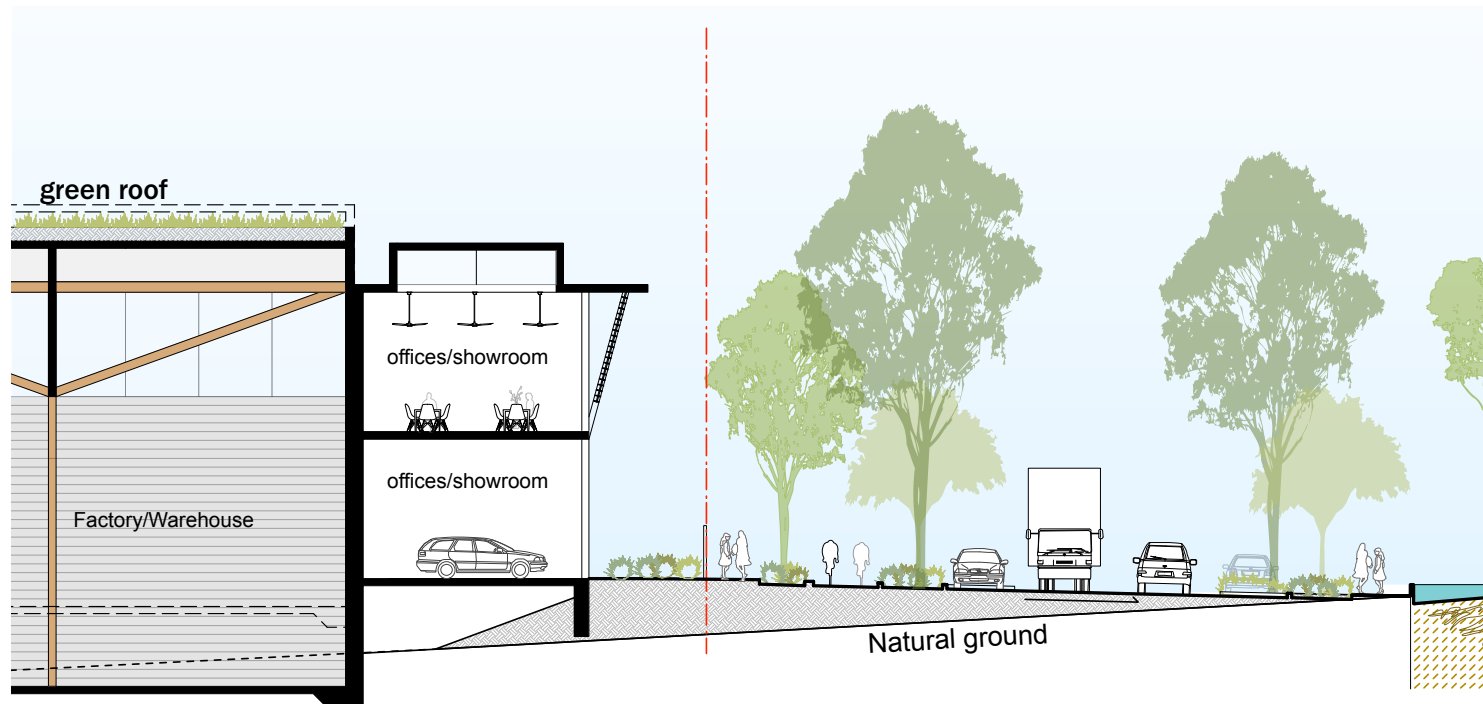
DD MMMM 2020
5000m

Topography and The Building Typology Challenge

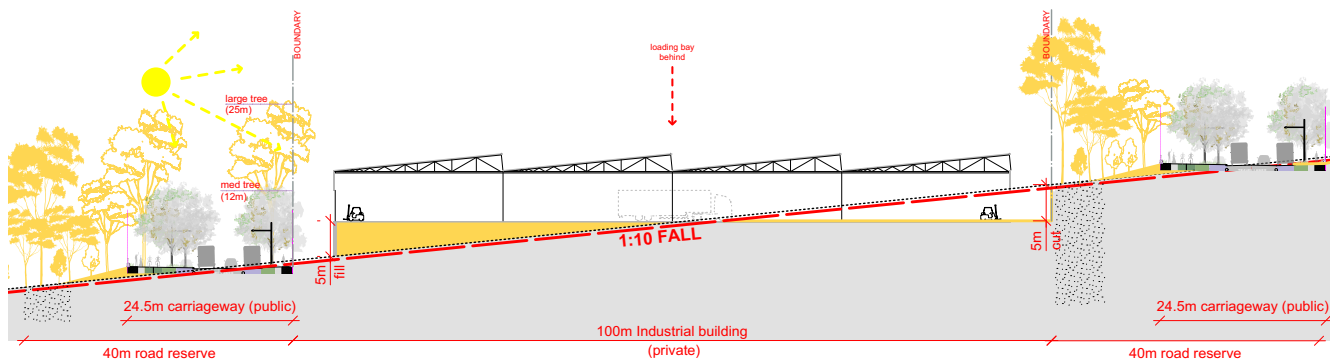


Slope analysis - many parts of the precinct steeper than 10% gradient

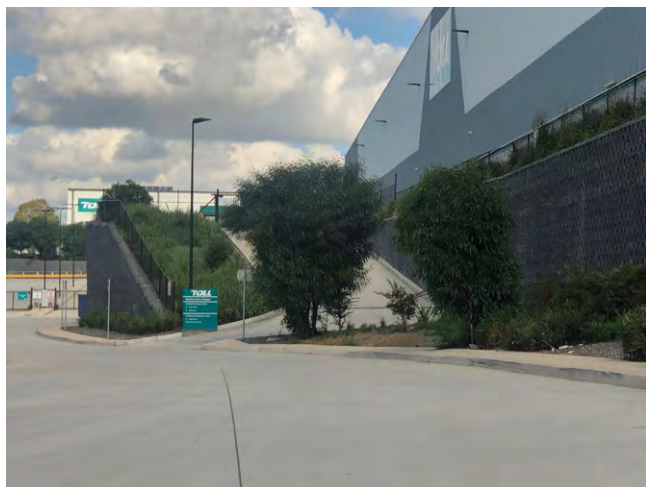
A New Approach to Industrial Building Typology - Creating active frontages on steeper sites



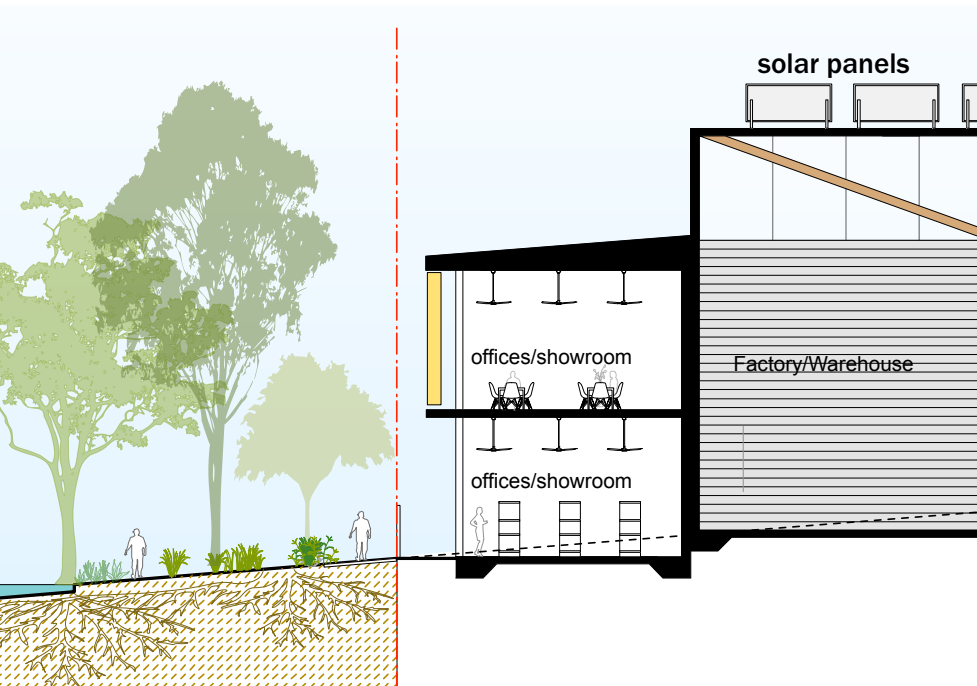
Active uses associated with industrial developments situated along streets to activate frontages. Refer to Industrial Built Form on P86, for more detail.



A typical approach to building large footprint on steeper terrain - deactivated street frontages



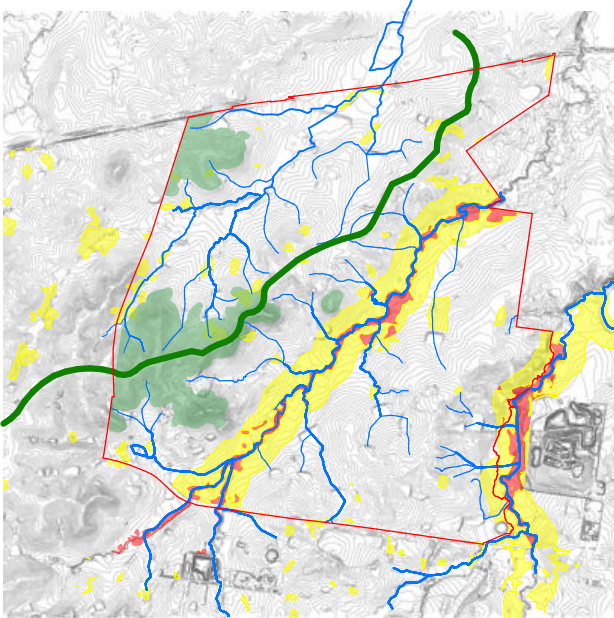
Prestons - Business as usual example of industrial building on steeper terrain - deactivated frontage



The Roofscape as Resource

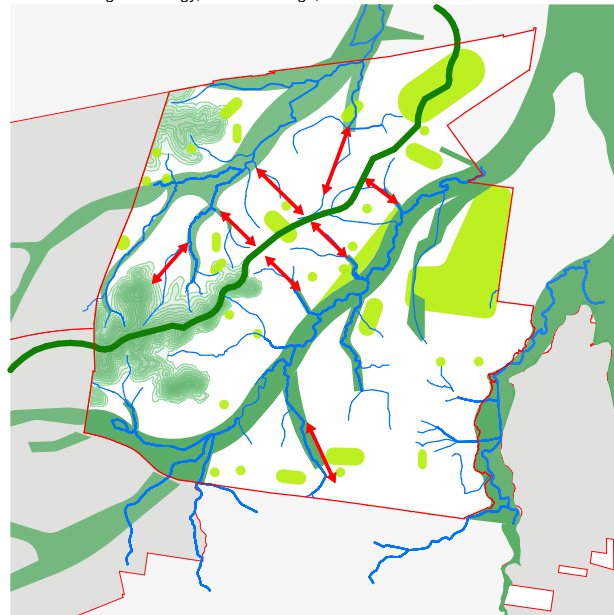
- The roofscape within the Northern Gateway precinct should be utilised to harvest rainwater, produce solar power or green roofs.
- Water harvested can be re-used within the Northern Gateway in a closed or open system depending on scale.
- Energy produced can be used on site or linked to the broader energy network to support the Aerotropolis and Greater Sydney.

PRECINCT PRINCIPLES AND STRUCTURE



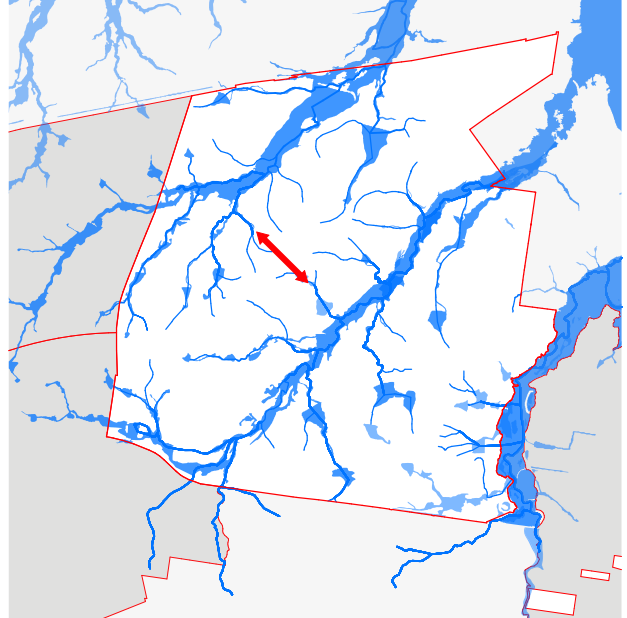
1. CONNECTING TO COUNTRY

- Establish Hilltops as safe places, vantage points, and markers in the landscape
- Ridgelines define the primary site structure
- Aboriginal Heritage Sensitivity High
- Aboriginal Heritage Sensitivity Moderate
- Map, record, and investigate indigenous heritage beyond landscape connections, including archeology, natural heritage, and culture.



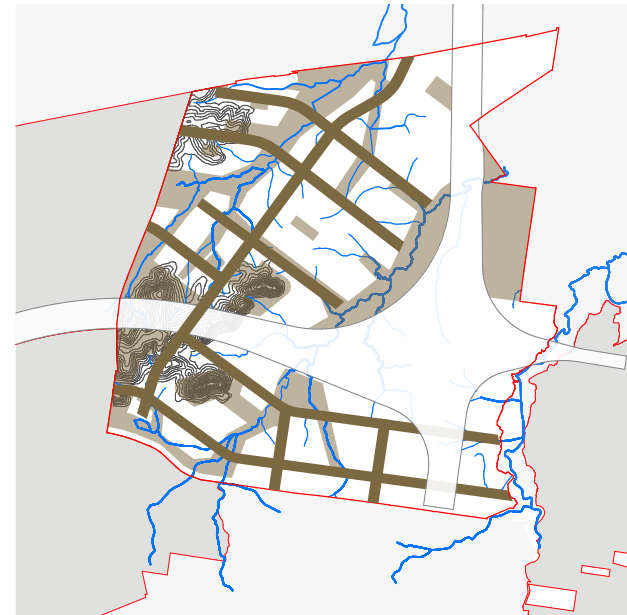
3. PRESERVE AND PROTECT LANDSCAPE ECOLOGY

- Position primary open space at hilltops
- Retain and protect Endangered Ecological Communities (EEC)
- Use floodplain (1% AEP) for riparian corridors, recreation areas, open space
- Connect the ridges to creeks with green spines and open space corridors



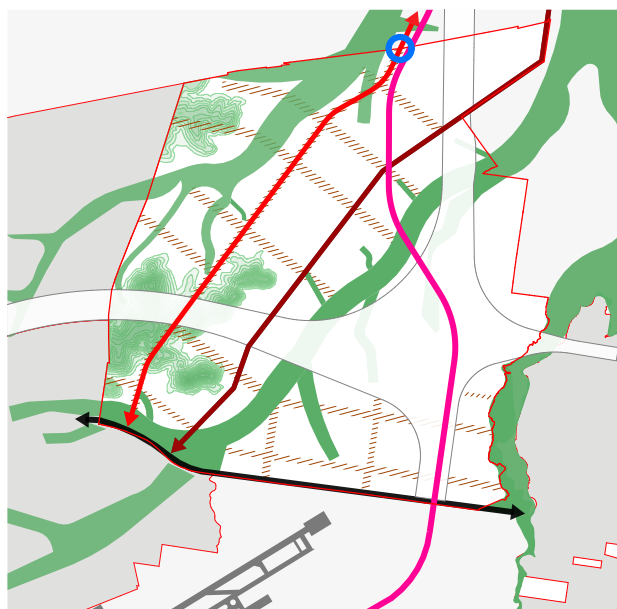
2. PRESERVE AND PROTECT WATER ASSETS

- Define floodplain (1% AEP) perimeter to establish riparian corridors, recreation areas, and developable area
- Creeks of 3rd order and larger retained.
- 1st and 2nd order to be retained within high environmental areas.
- Retain and 1st order creeks where possible and realign where necessary
- Provide a creek to creek landscape connection



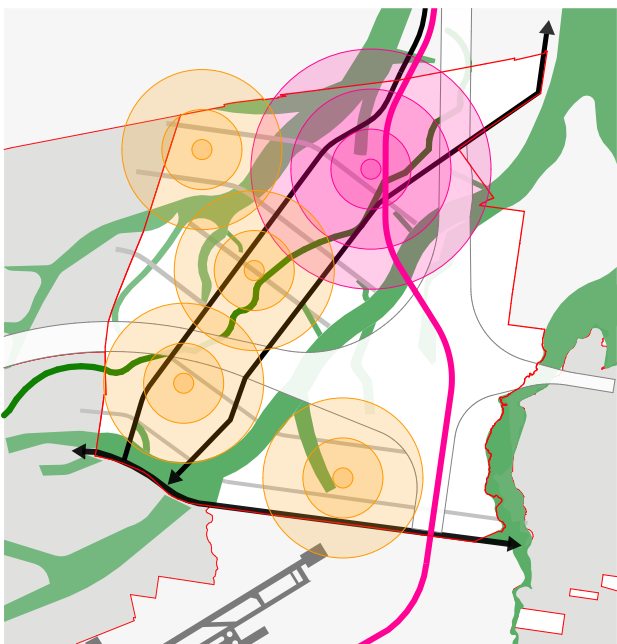
4. ESTABLISH AN UNDISTURBED EARTH NETWORK

- Protect soils in-situ in corridors connecting creek to creek, ridge to creek to retain undisturbed soil corridors throughout the precinct.
- Locate parks and open spaces along the Undisturbed Earth Network



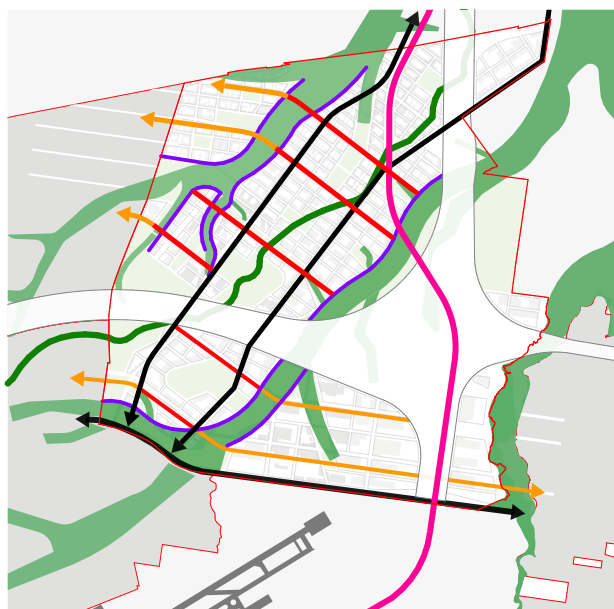
5. KEY STREETS

- ➔ Retain Luddenham Road as the key road through the precinct.
- ▨ Undisturbed Earth Network
- ➔ Make new north/south road between the creeks and parallel to Luddenham Road to:
 - Structure the future precinct alignment to the creeks and ridgelines
 - Share the public transport and traffic load on Luddenham Road
 - Explore a second crossing over the Warragamba pipeline.



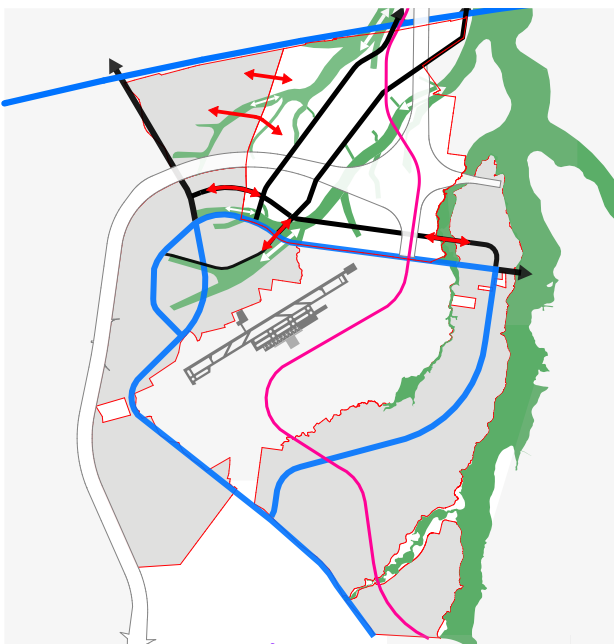
7. LOCAL CENTRES

- Locate Local Centres throughout precinct to provide varied public, community, dining, and retail activities. Distribute centres throughout precinct to enable walkability from employment areas.
- Primary Centre at Metro Station. 400/800/1200m pedestrian/cycle catchment
- Local Centres (non-residential uses) distributed throughout precinct. 400/800m pedestrian catchment



6. PRECINCT STRUCTURING PRINCIPLES

- East West connections structure the precinct based on topography, landscape connections, and development efficiency.
- ➔ Between the creeks street are oriented to the Creeks and Luddenham Road. Streets run from creek to ridge, with the ridge framed against the sky.
- ➔ Outside the creeks, streets are oriented to the Western Sydney Grid
- ➔ Edge streets define and provide access to riparian zones and open space



8. INTEGRATION AND CONNECTIVITY WITH AEROTROPOLIS AND CONTEXT

- Connect and integrate development areas, open space, water, and local centres with adjacent Aerotropolis Precincts and immediate context.
- ➔ Green Grid connections
- ➔ Aerotropolis link road
- ➔ Connections to adjacent precincts

THE BLUE-GREEN INFRASTRUCTURE FRAMEWORK

The Drafts Cumberland Plain Conservation Plan is an important instrument for protecting avoided lands for their high value biodiversity, and the biodiversity value along riparian corridors.

The River-Flat Eucalypt Forest is listed as an Endangered Ecological Community (EEC) under the *Biodiversity Conservation Act 2016* (NSW).

Swamp Oak Forest is also a listed EEC under the *Biodiversity Conservation Act 2016* (NSW) and Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth)

The presence of River-Flat Eucalypt Forest and Swamp Oak Forest is along Cosgroves Creek in the Northern Gateway precinct.

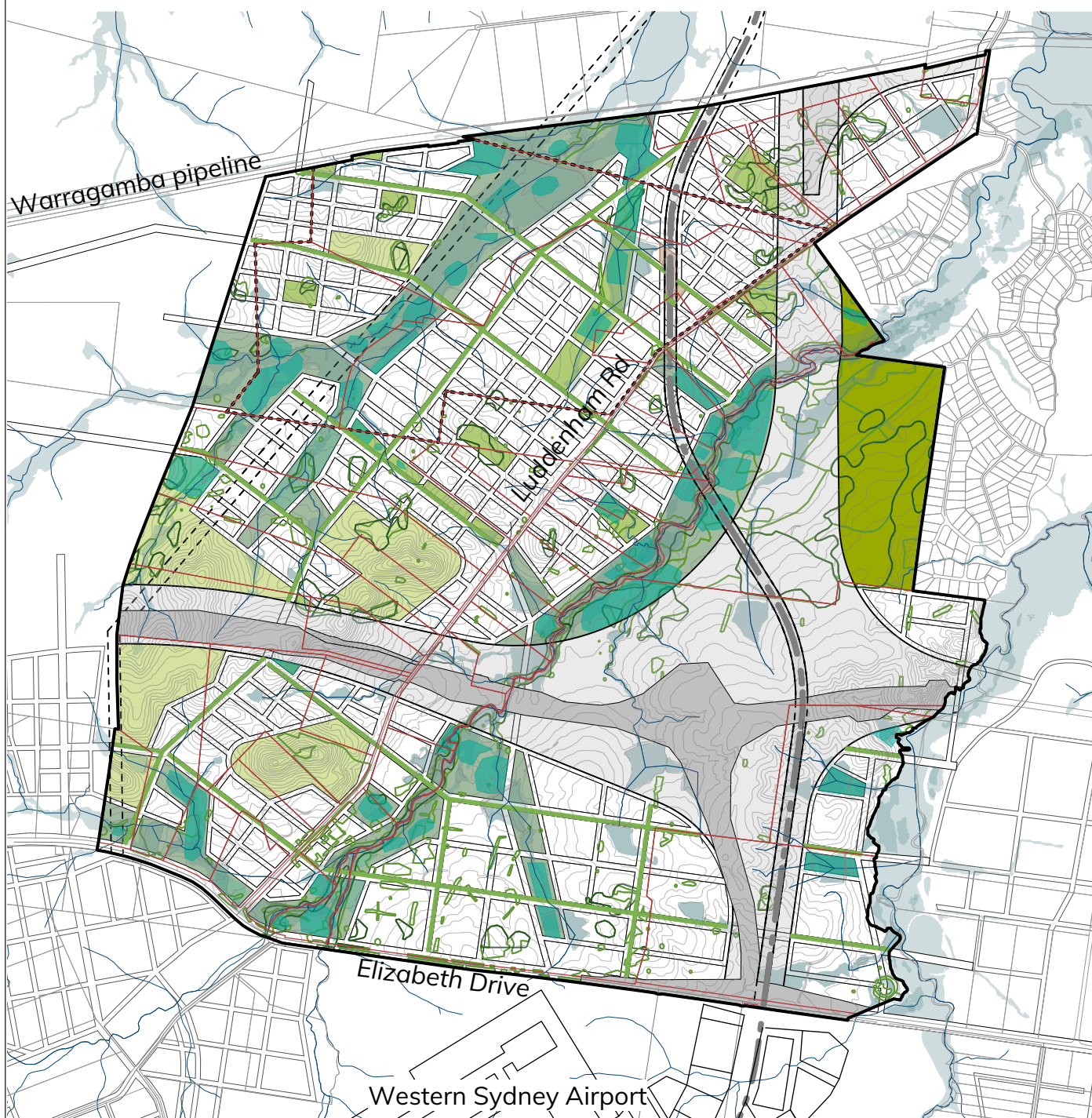
Other EEC include the Shale Plains woodland and Shale Hills woodland located in some of the elevated hilltop areas of the precinct.

Where appropriate development

shall avoid, minimise, mitigate impacts to biodiversity. Where possible, developments should seek to minimise impacts and reduce disturbance to riparian corridors. Developments must also consider the requirements under the *Water Management Act 2000* (NSW).

Investigations are still being conducted to identify and acquire land for a future water detention basin as part of the delivery of the Sydney Metro - Western Sydney Airport. Land near the proposed M12 and Metro entrance into the Airport, on University of Sydney owned land, may be affected by the future delivery of this infrastructure. Further detail can be found in the *Environmental Impact Statement for the Sydney Metro – Western Sydney Airport*, on exhibition from 21 October – 02 December 2020.

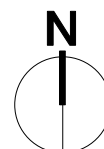
The Blue-Green Infrastructure Framework is an interconnected network of parks, open spaces and streetscapes. Vegetation and planted areas on private lots also contribute to this framework.



- Sydney Science Park Boundary
- Cadastre
- Precinct Boundary
- Proposed Riparian Park
- Proposed Ridgetop/Hill Top Park with district park facilities
- Proposed Urban/local Park
- Proposed Nature Park
- Endangered Ecological Communities (EEC)-Nature parks where substantial EEC exist
- Unprotected existing vegetation-Nature parks where substantial remnant vegetation exists
- Proposed Streetscape Open Space

- WSUD and detention basin investigation areas (indicative only)
- 1% AEF
- 2m contours

0 500 1000 M



PUBLIC DOMAIN PLAN

PROVIDE OPPORTUNITY TO CONNECT TO COUNTRY

- The public domain retains existing visual and physical connections to the landscape.
- It will reveal the topography, distant views and big sky, providing opportunities to connect to Country.

REPAIR AND PROTECT THE WATERWAYS AND TRACES OF WATER

- Healthy creeks, dams, floodplains
- Public space to front all riparian crossings
- Integrate stormwater management into public space
- Allows water to travel through the public domain at a slow pace
- Preserves creek corridors
- Connect creek corridors to ridges and hilltops

REPAIR AND PROTECT THE CUMBERLAND PLAIN

- Protect trees, birds, animals, insects and grasslands
- Plant endemic species
- Lower the albedo
- Celebrates the existing Western Sydney landscape

- Streets trees provide sun protection to street surface and adjacent buildings
- Generous public domain edges to all parks and riparian corridors
- Achieve 40% urban tree canopy to lower the albedo

PROTECT AND NURTURE THE SOIL

- Connected mycorrhiza sponge, to combat salinity
- Carefully manage cut & fill
- Make contiguous areas of soil & natural ground
- Use permeable surfaces
- Smaller blocks on steep land
- Preserves soil and provide maximum opportunity for soil biota and water retention by minimising pavements

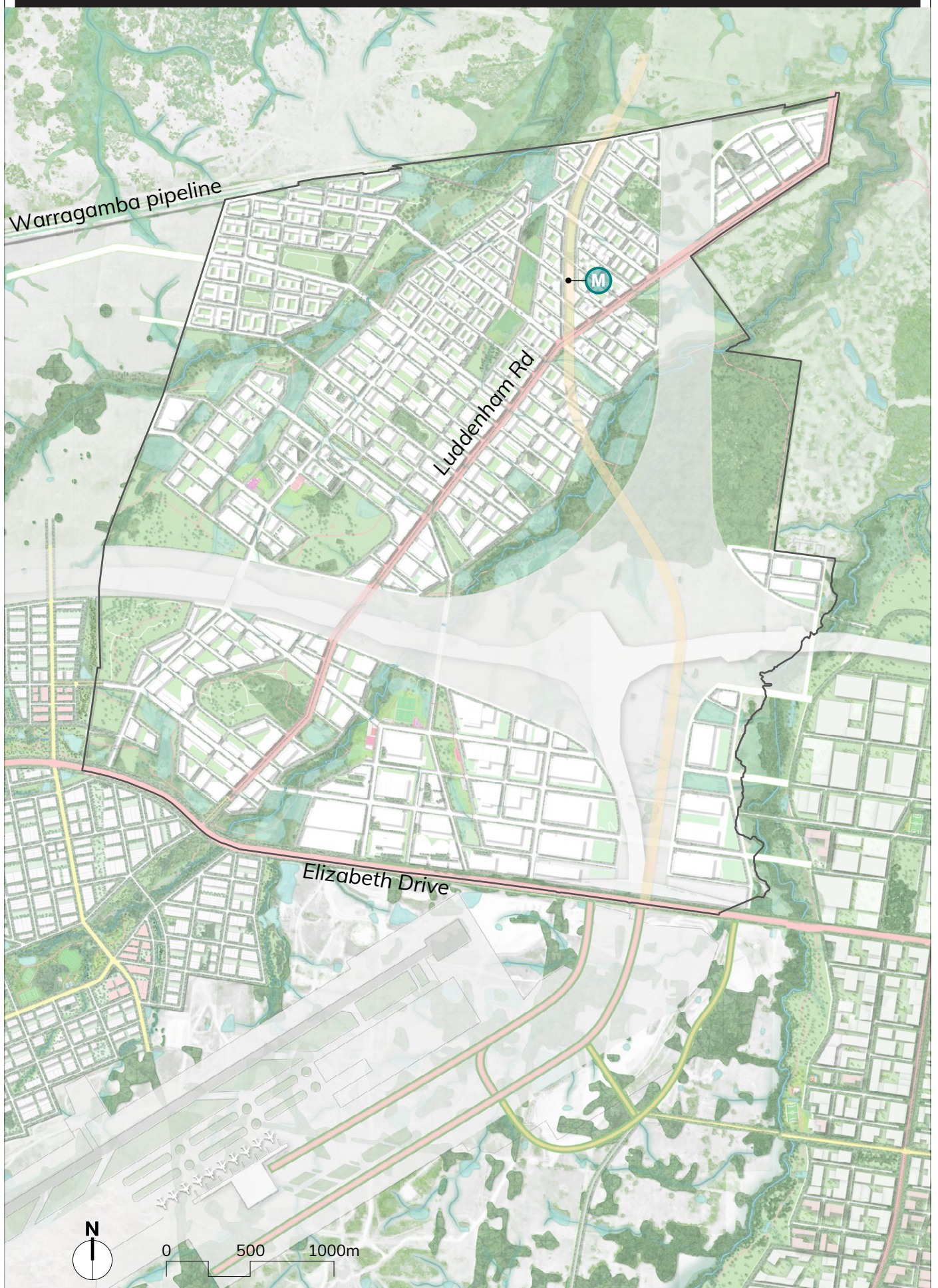
CELEBRATE THE TOPOGRAPHY

- Emphasise ridges, valleys, hills, slope, views
- Retain ridges & hilltops
- Use roads and open space to make topography legible
- Manage cut and fill to echo the landscape form of undulating topography.

LAYOUT AND STREETS

- Streets should provide orientation, address, a clear and legible hierarchy and allow for flexibility and changes in use over time.
- They must discretely provide for the needs of servicing and practical movement
- Overwhelmingly they must provide evocative and highly memorable ways of moving through the landscape. This movement should be celebratory and experientially rich - for pedestrians, cyclists and vehicles alike.

The public domain is the framework for civic and social life. Streets, parks and public spaces create networks for casual socialisation and active recreation. The Northern Gateway public domain should preserve the inherent qualities of Western Sydney landscape.



OPEN SPACE TYPOLOGY

Riparian/linear parklands along tributary (often ephemeral) creeks

- Linear parklands along the often-ephemeral creeks play an important role in riparian vegetation preservation and waterway health. This network of open space is an important connector and forms the armature to the parkland city.
- Waterways of Strahler Order 2 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 2 or higher, rehabilitation will occur to return that waterway to a natural state to enable natural processes and functionality to be maintained. Creeks of 1st and 2nd order are to be retained where they are in high environmental value areas.
- The riparian parks provide passive recreation, cycle and pedestrian connectivity across the precinct allowing for extensive off street journeys. The linear parklands also play an important role in the water management in particular when water is held higher in the catchment and away from saline and sodic soils. Active transport routes are incorporated within these parks.

Ridgeline & hilltop parks

- Ridgeline & Hilltop Parks are District or local in character - dependant upon size.
- These incorporate significant areas of remnant vegetation tend

to have steep slopes with some lesser gradients around their lower perimeter where active recreation, community amenities and playgrounds are to be accommodated.

- Higher on the hill passive recreation in the form of lookouts, picnic areas and walkways are to be provided.

Urban parks and pocket parks

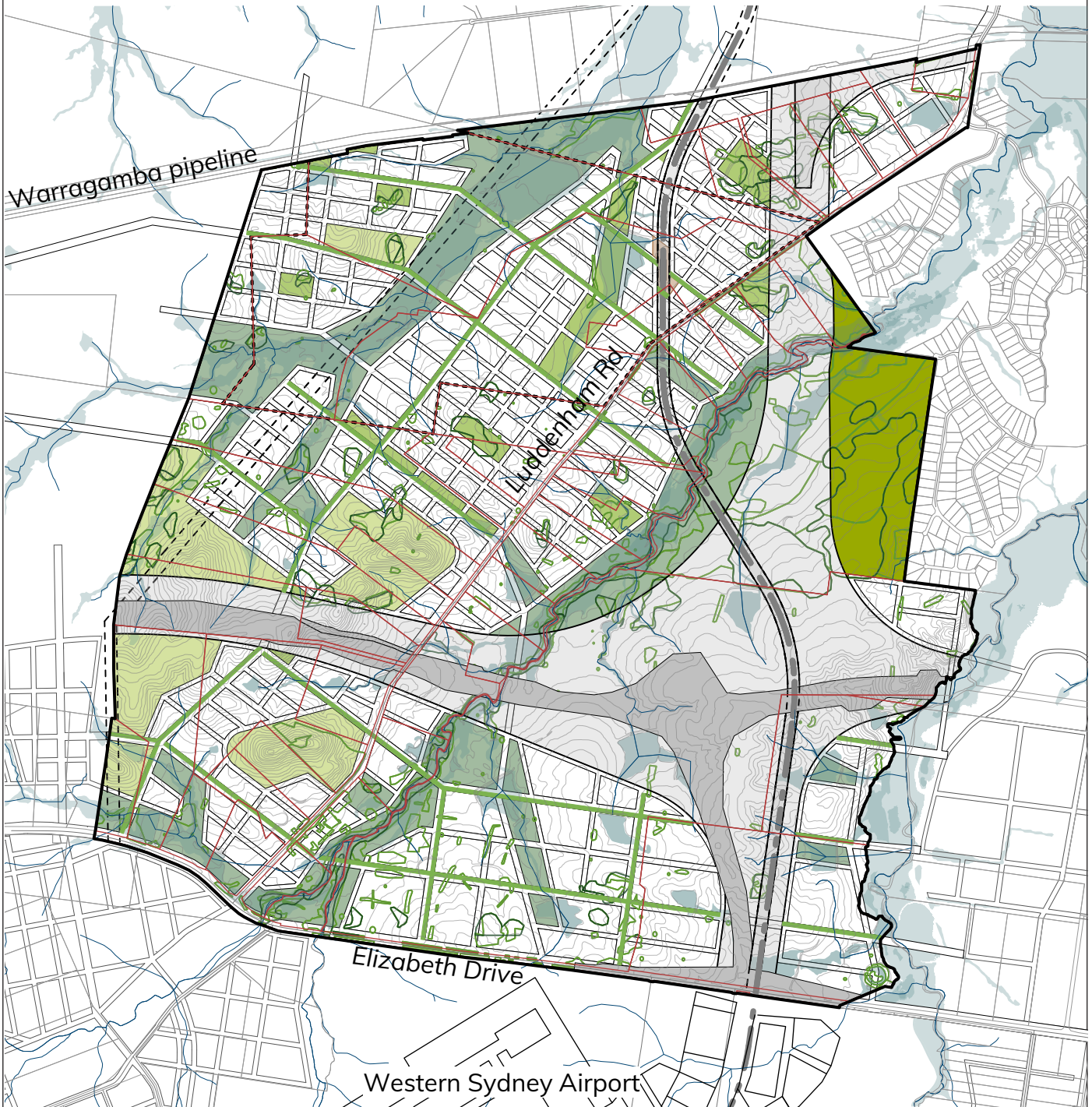
- Urban parks and pocket parks associated with the strategic centre, local centres and enterprise areas are situated to provide open space for all within walking distance.
- These cater to a variety of landscape requirements, such as vegetation protection, new tree canopy, water management, soil preservation whilst meeting recreational needs through the provision of community amenities, passive and active recreation, playgrounds, fitness nodes at a scale appropriate to its designation as a local or district such as in the Aerotropolis Core centre

Nature parks

- Areas proposed around protected existing native vegetation.
- These areas are often incorporated within linear parklands and ridgeline parks.
- A non structured, low impact recreation focus of a district and local character is incorporated, ensuring no negative impact on the remnant vegetation community.

Streetscape

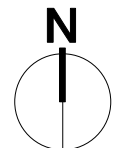
- Streetscape is an integral component of the overall open space framework and provides the opportunity for continuous tree canopy and ground cover planting rich in diversity that allows for wildlife to migrate through the urban fabric.
- The streets also provide important shaded connections from creek to ridge for pedestrian connectivity.
- Street planting shades adjacent facades to help mitigate urban heat island effects and provide pleasant micro climate for activation..



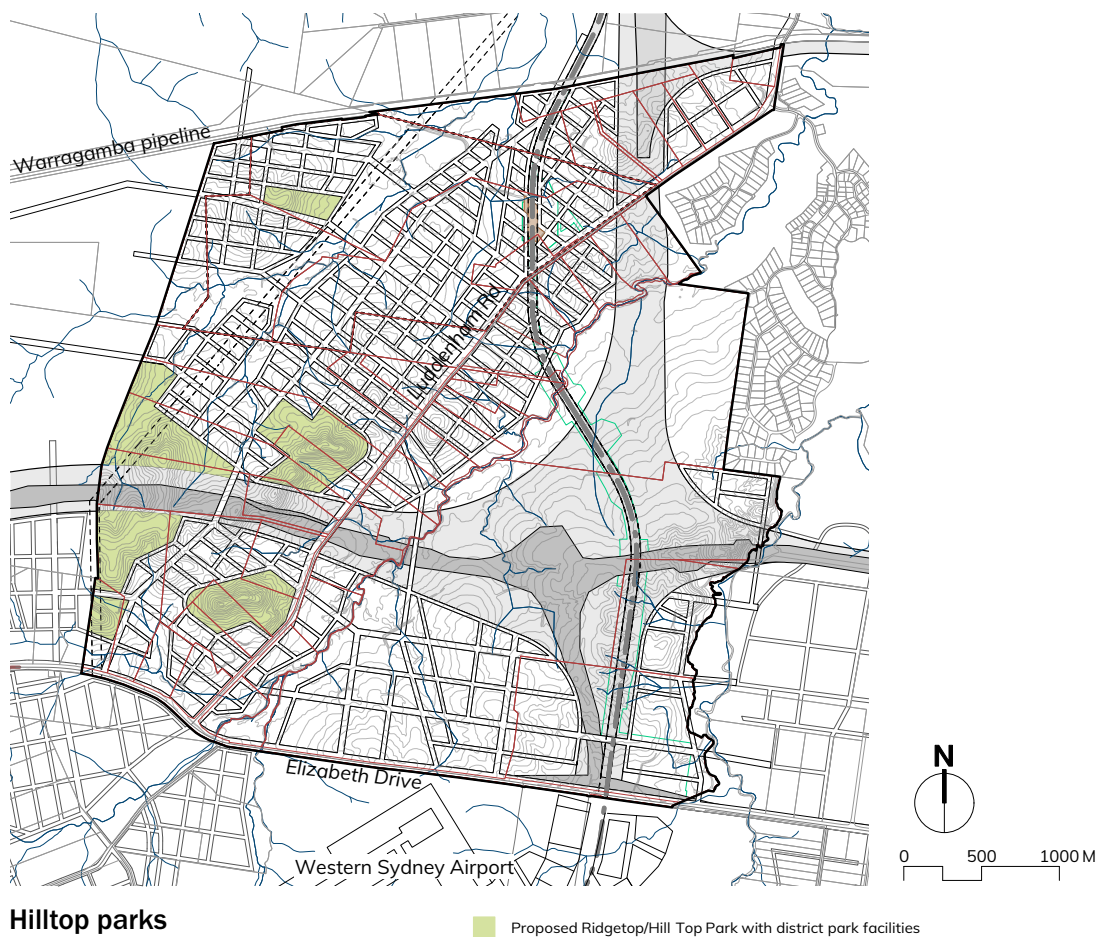
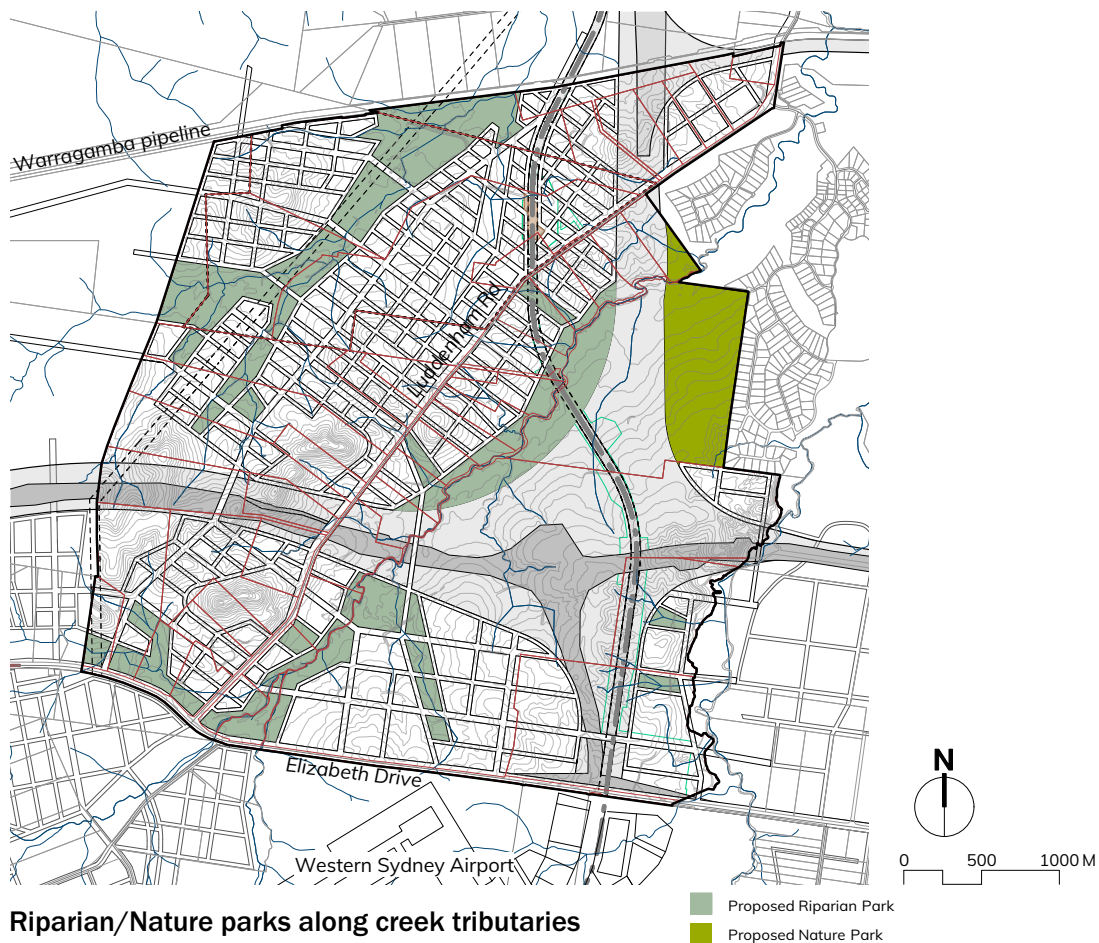
- Sydney Science Park Boundary
- Cadastre
- Precinct Boundary

- 1% AEF
- 2m contours

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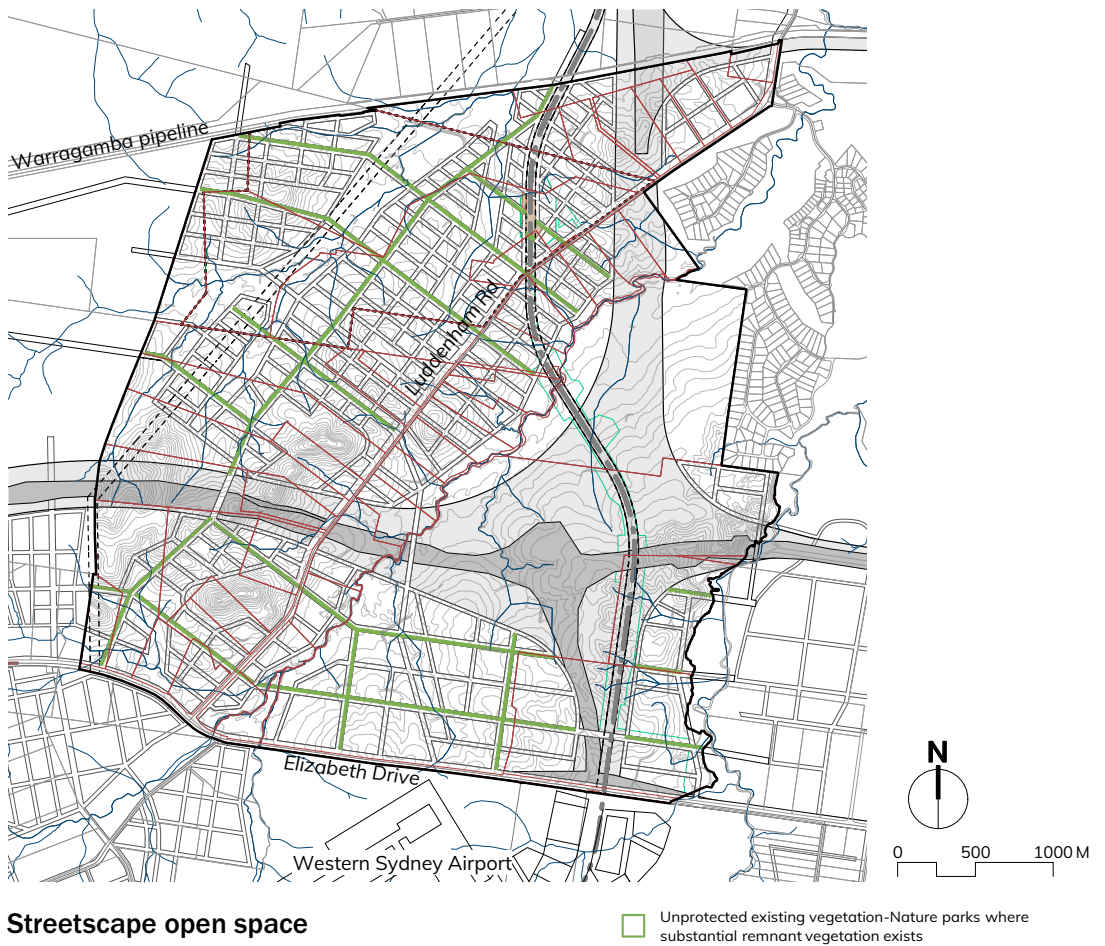


- Proposed Riparian Park
- Proposed Ridgetop/Hill Top Park with district park facilities
- Proposed Urban/local Park
- Proposed Nature Park
- Endangered Ecological Communities(EEC)-Nature parks where substantial EEC exist
- Unprotected existing vegetation-Nature parks where substantial remnant vegetation exists
- Proposed Streetscape Open Space





Urban parks



Streetscape open space



Aerial view from the north





View down valley of a hilltop park in the mixed used zone, looking towards the Specialised Centre.



UNDISTURBED SOIL NETWORK

The USN is the network of interconnected undisturbed site soils. It occurs in riparian corridors, parks and specially designed corridors such as streets with USN. The USN is key to achieving healthy ecosystems and good water retention in clay landscape of the Cumberland Plain. A USN is the foundation for the health of the Blue and Green Grid.

The soils of Western Sydney Cumberland Plain when in their undisturbed state are integral to the proper functioning of the Green and Blue networks. A healthy soil ecology plays a complex, dynamic role via living biota in the overall ecology of place as the major driver of all energy systems, increasing the water absorption of soils by providing increased in ground carbon storage, increased nutrient and mineral availability and by suppressing soil pathogens and salinity.

Soils within the USN are to remain undisturbed and be continuous,

allowing for connectivity of soil ecology. Engineered cut and fill and topographic alteration is not permitted due to the damage this causes to soil profiles and the ecologies therein. Localised excavation for footings, shallow sub bases to paths, tree planting holes and the like are permitted. Service trenches are to be minimized within the USN. Where unavoidable, the A and B soil horizons are to be removed separately stored separately and replaced in their correct order.

Planting holes and trenches within engineered fill for roads and building platforms does not constitute healthy connected soil.

Civil engineering practices are to be refined and improved to achieve the USN. Business as usual will not achieve the desired outcome. Sites need to be considered holistically to ensure USN preserving cut and fill strategies are established early.

The starting point for cut and fill strategies is to be the preservation of the USN.

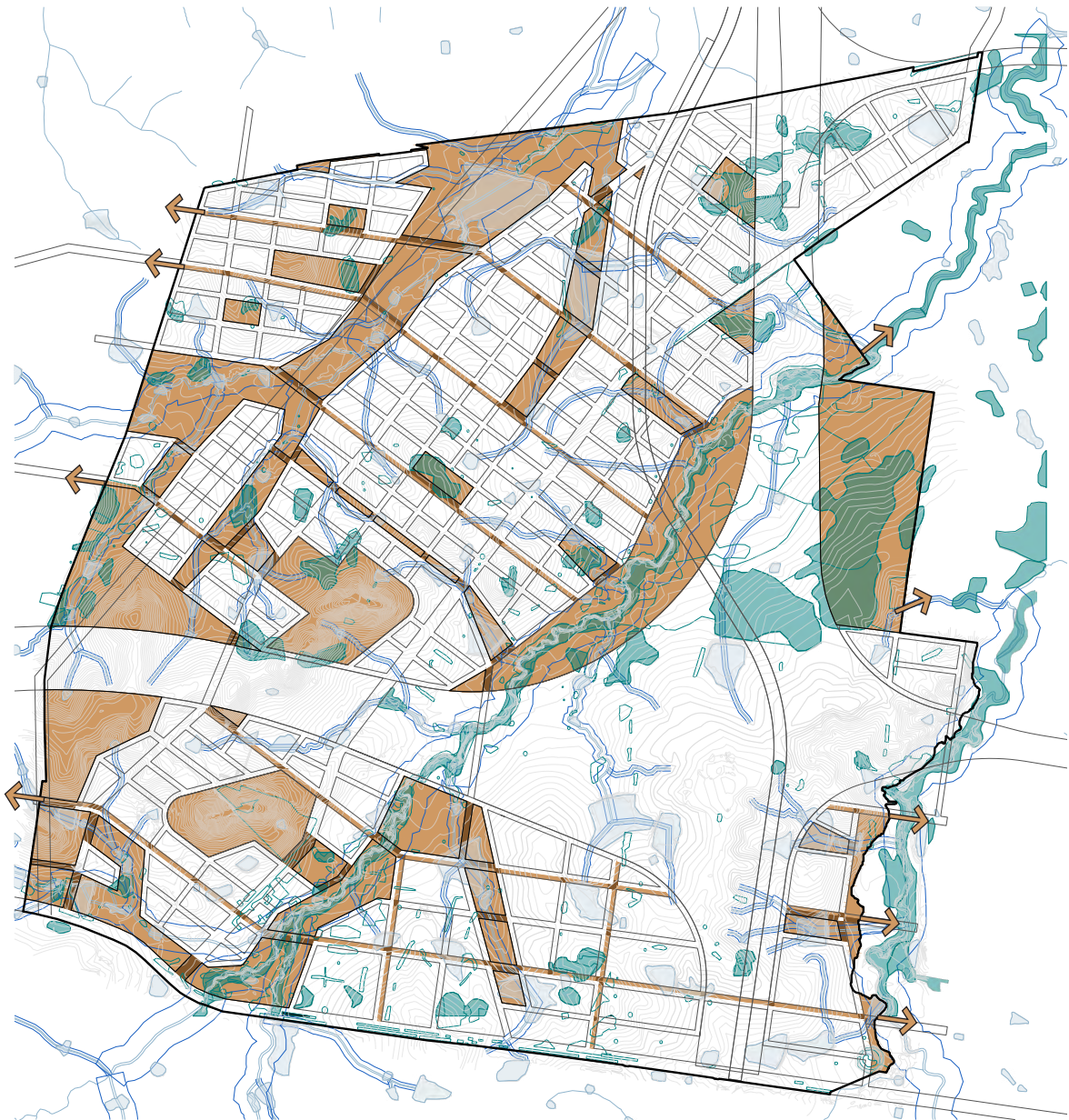
PRINCIPLES

- Preserve top soils - these contain the biomass
- Preserve natural undisturbed soil profiles – these store more carbon, store more water and result in healthier ecosystem
- Establish through site study zones where water comes to the surface (as a result of topography and or geology, e.g. slope inflection points) and preserve these for Intercept planting
- Accurately map soil types to determine location of red soils suitable for infiltration
- Accurately map soil types to determine location of high salt to avoid irrigation in these areas.

SUPPORTING POINTS

Key points from discussion with stakeholders

- Topsoils are crucial as they are the stratum that contains the biota stockpiling in large mounds kills this
- Red soils have better structure, porosity and better place to store water
- Soils are generally duplex with sandy topsoil and clay rich subsoils that are sodic (prone to salinity and loss of structure under contact with water does not recombine)
- Break points in topography tend to create soils of different texture allowing water to escape at these points and bring salt to surface
- The very flat sedimentary bedding in the shale can also cause water to travel horizontally and exit mid slope
- Detailed ground truthing will be required to establish soils locations with any accuracy, current mapping is based on 1:100,000
- At this broad scale stage, principles should be adopted rather than technical solutions that require accurate and detailed information eg proposed levels, surfaces, existing soil types, anticipated runoff
- Strategy for salinity in soils is bound to water strategy.
- Aim not to change existing water regime, frequency of run off and absorption
- Need to shed water to avoid overloading soils and ground water and evaporation from dams is a good method, evapotranspiration from trees is positive
- Flushing soils with additional water (ie irrigation to shed water) has negative impact on ecology and even diluted salt will change species composition and tolerance
- General strategy is to recharge soil up slope, intercept it with mid slope planting to allow evapotranspiration before it reaches riparian zones.



- 1 Undisturbed Soil Network
- 2
 - Protected soils & natural profiles
 - Bridge - Undisturbed soils continue under
 - Earth grid connection outside of site
 - Endangered Ecological Community (LEP)
 - Existing woodland
 - Creek corridor
 - VRZ - Vegetated Riparian zone
 - Existing water basins
 - 1m contours
 - Precinct boundary
 - Proposed street network

Annotations / Rules

1. **Undisturbed Soil Network (USN). Continuous corridors connect to larger natural soil areas (riparian or park natural soils)**
 - On streets: Generally located uphill from slope.
 - Roads bridged for natural soil to continue under.
 - Adjacent street with topographic alteration fall to the USN enabling on grade interface.
 - Left over fill form within private development lots can be used to fill the altered road topography
2. **Protected soil & natural soil profiles are not disturbed.**
 - Engineered cut, fill or topographic alteration not permitted within full extent of brown grid due to the damage this causes to soil profiles & ecologies therein.
 - Water absorption is natural and carefully managed to mitigate salinity.
 - Localised excavation for footings, shallow sub bases to paths, tree planting holes are permitted, however A & B soil horizons are to be removed separately, stored separately & replaced in correct order.
 - Permeable paths, stepping stones are permitted. Pavements are to be minimised.

Undisturbed Soil Network Streets

The USN Streets are key to achieving the precinct objective of Connecting Ridge to Creek and Creek to Creek with healthy habitat corridors. The USN streets provide connectivity and continuity to soil which are an integral part of the ecosystems. Soils cannot be thought of as separate to either the ecosystem or Country and as such must also be preserved and connected.

The USN Streets are strategically located to provide healthy green connections across the precinct, to

make the landscape and Country legible, to provide ideal growing conditions for the all-important large trees, to store water in soil, to create cooling through evapotranspiration and shade, to create densely vegetated streets to mitigate hot winds and to reinforce the Parkland City.

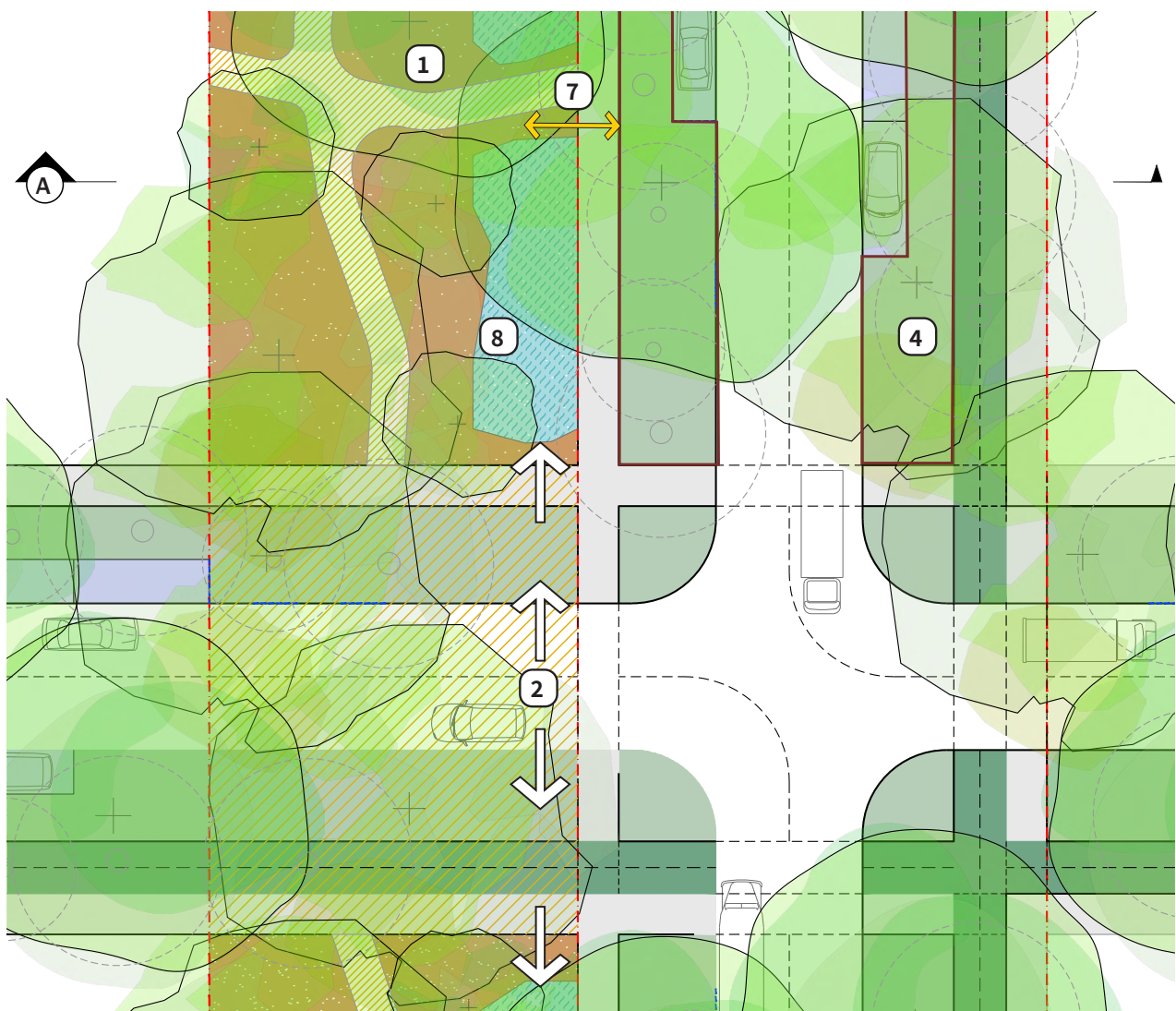
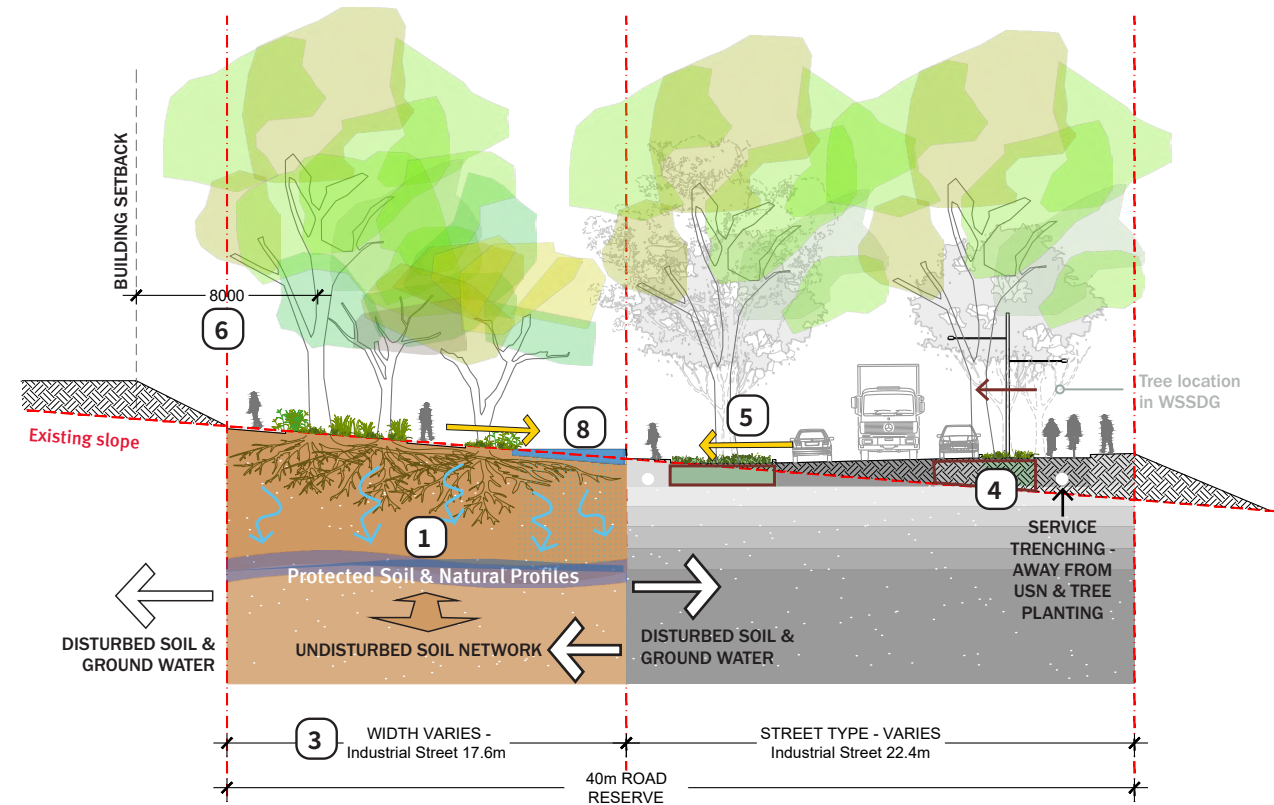
The Undisturbed Soil Network Streets build upon the Western Sydney Street Design Guideline (WSSDG) by providing additional width for the USN. The additional width reflects the

canopy spread of a large tree, thereby ensuring an undisturbed, ecologically healthy soil area equal to the drip zone of a large tree along the length of the USN Street.

In all cases, street cross sections maintain the functionality required by the WSSDG (travel lane, flex zone, parking aisle, footpath and cycle path widths as stipulated in the WSSDG, for that street type).

Guidelines

1. Protected soil & natural soil profiles are not disturbed.
 - Engineered cut, fill or topographic alteration not permitted within full extent of brown zone due to the damage this causes to soil profiles & ecologies therein.
 - Localised excavation for footings, shallow sub-bases to paths, tree planting holes are permitted, however A & B soil horizons are to be removed separately, stored separately & replaced in correct order.
 - Permeable paths, stepping stones are permitted. Pavements are to be minimised.
 - Water absorption is natural and carefully managed to mitigate salinity.
2. Earth Zone: Continuous corridor connects to larger natural soil area (riparian or park natural soil)
 - Located uphill from slope.
 - Roads bridged for natural soil to continue under.
3. Width of Earth Zone varies depending on street type. Widths for 40m road reserve:
 - Sub Arterial Road - USN (40m road with Undisturbed Soil Network)
 - Local Collector - USN (40m road with Undisturbed Soil Network)
4. To achieve 100% canopy cover in streets: Mature canopy diameter = tree spacing.
5. Cycle & planted zone swapped from Western Sydney Street Guide to enable combined soil volume enabling large trees & 100% canopy cover (minus intersections).
 - Large tree = 16m dia
 - Medium tree = 8m dia
 - Small tree = 5m dia
6. Street falls to Natural Soil Zone.
 - To alter the topographic fall of the streets towards the USN, left over fill from cut and fill within private development lots can be used to fill the altered road topography.
7. Large trees in planted 8m from facade to ensure full canopy spread is achieved.
8. On grade transition from street to Park
9. Rain Gardens within the USN



Undisturbed Soil Network Parks

(Park interface)

Local and District Parks are an important part of the precinct and make a significant contribution to both the environmental urban amenity of the Parkland City. The parks are an integral part of the Undisturbed Soil Network and also act to preserve existing EEC vegetation. The USN in these parks enhances vegetation, water storage capacity and carbon holding ability and contributes to ecological health. Where possible they are to be connected to other areas of undisturbed soil to maximize the

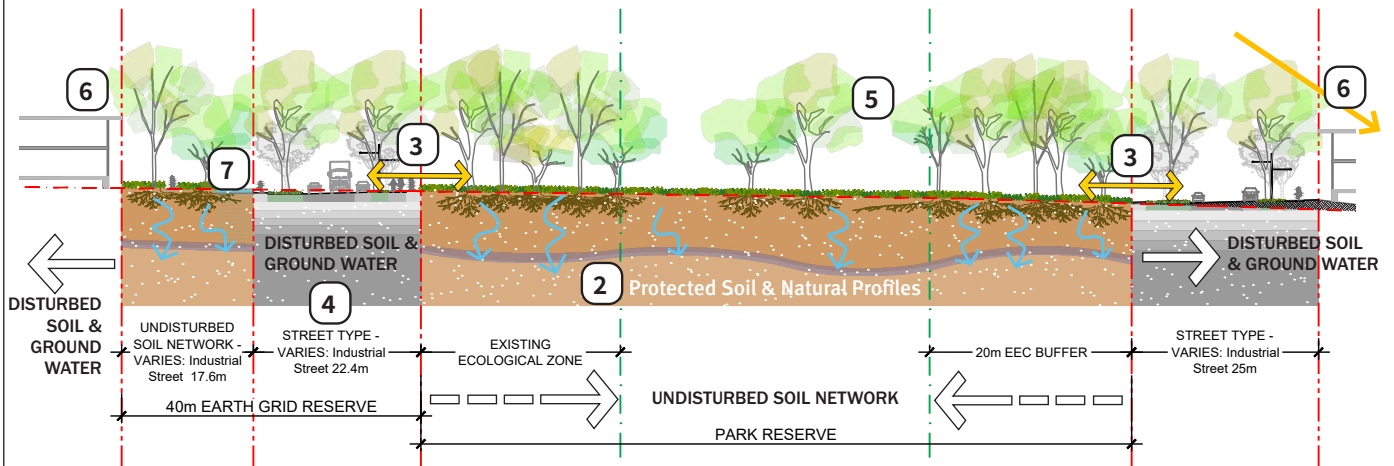
connectivity of the soil ecosystem. To ensure these parks are well integrated into the city and their soils remain undisturbed engineering solution are to be found that allow the interface between streets and park to remain at natural grade and that filling and cutting into the parks is avoided. Where grade separation between street reserve and park is totally unavoidable vertical level changes with ample pedestrian access should be utilized to ensure soils within the park are not altered. All recreation infrastructure within the

parks is to be built in such a way as to ensure protection of existing soils and permeability.

As a general rule streets on the high side of parks should be in cut whilst those on the low side in fill to ensure that earthworks do not encroach into the park. The at grade transition between park and street also integrates open space into the urban fabric to achieve the Parkland City vision.

Guidelines

1. Hilltop parks retained as key features. They provide connection to Country by providing creek to hilltop connections,
2. Protected soil & natural soil profiles are not disturbed.
 - Engineered cut, fill or topographic alteration not permitted within full extent of brown zone due to the damage this causes to soil profiles & ecologies therein.
 - Localised excavation for footings, shallow sub-bases to paths, tree planting holes are permitted. However A & B soil horizons are to be removed separately, stored separately & replaced in correct order.
 - Permeable paths, stepping stones are permitted.
3. On grade transition from street to park
 - Streets up slope from parks:
 - Place roads in cut to ensure park boundary is level & protect park soil.
4. Streets down slope from parks:
 - Placed on fill to ensure park boundary is natural level & protect park soil. Left over fill form cut and fill within private development lots can be used to fill the altered road topography.
 - Fall streets to park.
5. Parks to have min 60% tree cover(inclusive of Endangered Ecological Communities)
6. Heat Island Mitigation.
 - Locate building set back to ensure mature trees cast shade on facade
7. Rain Gardens within the USN



Undisturbed Soil Network at Riparian Interface

The Riparian corridors form an essential part of the Undisturbed Soil Network. Street edges and street crossings need to be designed to avoid soil disturbance within the riparian corridors. Roads crossing riparian corridors should be engineered to be above undisturbed ground in order to preserve soil profiles and soil connectivity, to allow water movement and to allow a clear legibility of the riparian landscape. By allowing the ground to flow

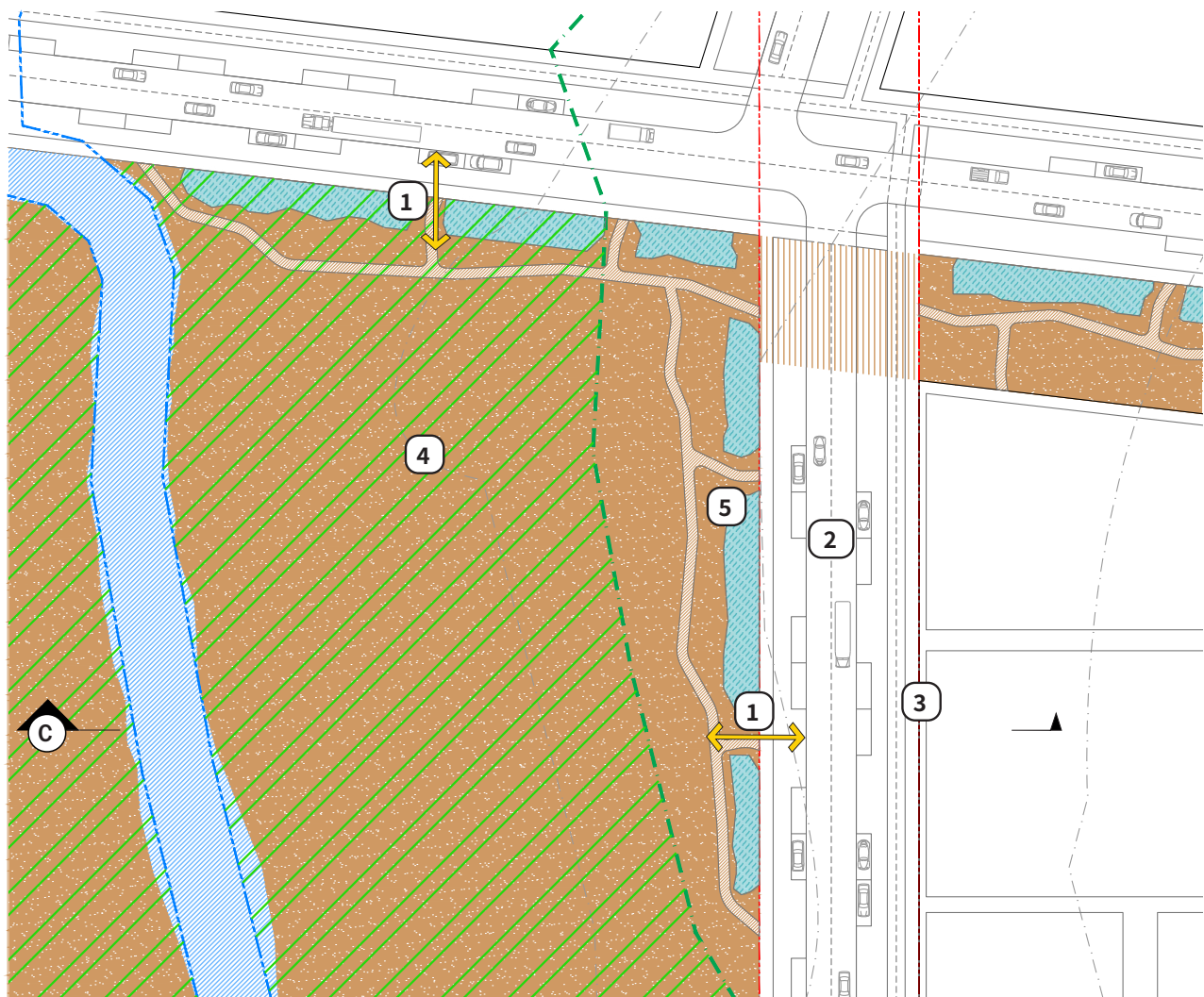
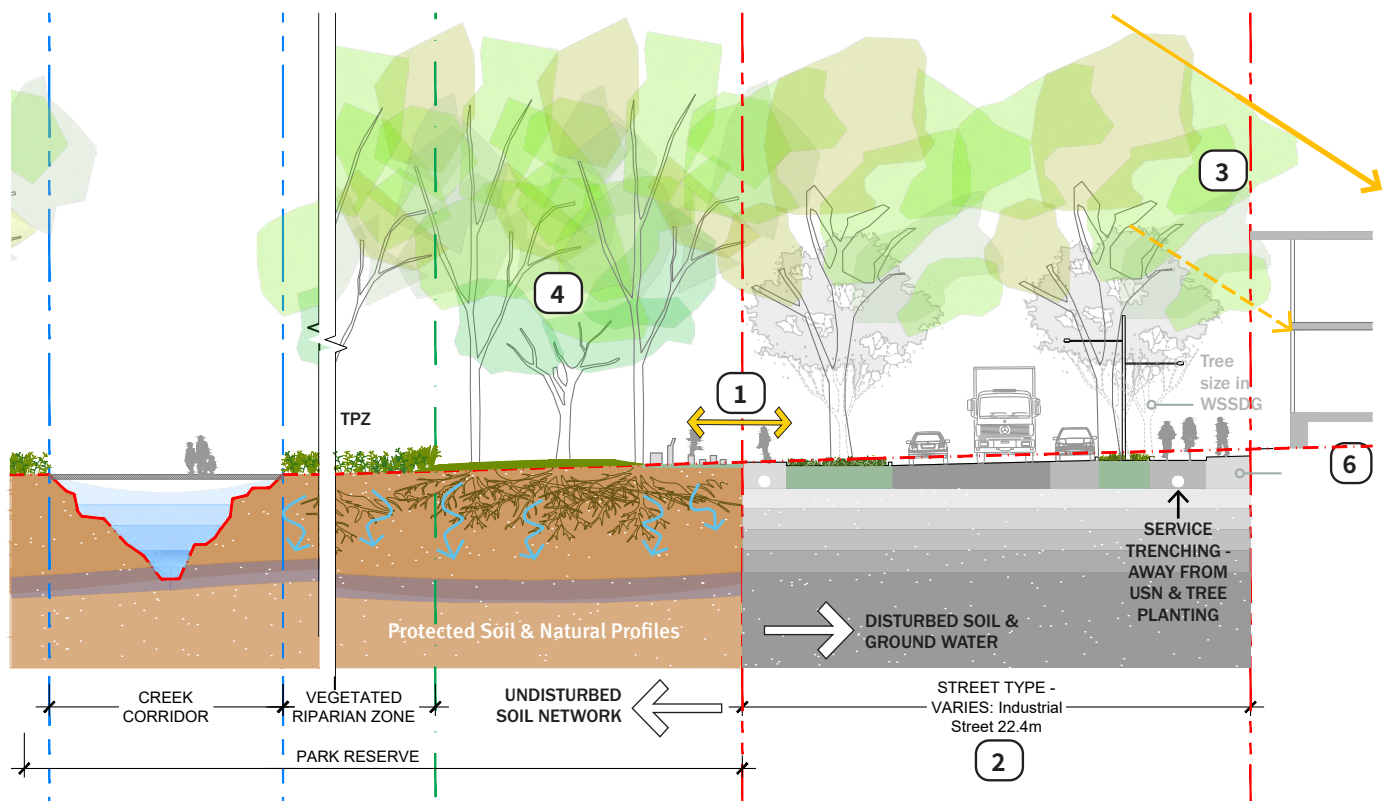
unimpeded the landscape character and topography remains legible.

To ensure a strong relationship is created between the street, the adjacent buildings and the riparian corridor/park, an at grade transition between the street and the park are essential. As such all earthworks and modifications to topography at the street/riparian edge are to occur outside the Riparian Corridor. To ensure development is integrated

with the open space as a Parkland City the civil engineering outcomes must ensure that Riparian edge streets are not separated by berms and the like, or elevated above the adjacent parkland.

Guidelines

1. Protected soil & natural soil profiles are not disturbed.
 - Engineered cut, fill or topographic alteration not permitted within full extent of brown zone due to the damage this causes to soil profiles & ecologies therein.
 - Localised excavation for footings, shallow sub bases to paths, tree planting holes are permitted, however A & B soil horizons are to be removed separately, stored separately & replaced in correct order.
 - Permeable paths, stepping stones are permitted.
2. On Grade transition from street to Park
3. Streets up slope from Parks:
 - Place roads in cut to ensure park boundary is level & protect park soil.
 - Fall streets to park
4. Large street trees planted 8m from facade to ensure full canopy spread is achieved, maximising shade cover to western facades.
5. Riparian parks to have min 60% tree cover (inclusive of Endangered Ecological Communities)
6. Heat island mitigation.
 - Locate building set back to ensure mature trees cast shade on facade
7. Rain Gardens within the USN



CULTURAL LANDSCAPES AND HERITAGE

Evolving concepts of Connection to Country have underpinned the Precinct Plan. Specifically, the retention of the creek corridors as generous green spines, the identification of the hilltops for new parks, and green links between these two primary topographic features interpret indigenous patterns of occupation and movement across the territory.

Additionally the alignment of historic Luddenham Road (listed as a local heritage item), which cuts across the original land grants, has been recognised as following an Aboriginal track. There is also a significant stand of trees along part of the eastern side of Luddenham Road, that should be retained in any upgrade.

The curved part of Elizabeth Drive's alignment adjoining the Agribusiness Precinct may also have an indigenous basis. The infrastructure upgrade of these roads needs to respect their rich historical associations.

The adjacent map indicates that areas of the highest Aboriginal heritage sensitivity are within the open space, riparian corridors allowing for considerable scope to develop local initiatives such as marked walking trails with potential direct links to Aboriginal culture.

There is also considerable scope to develop cultural and heritage interpretation strategies that are

particular to the area. These could detail local level initiatives such as public art, the interpretation of artefacts, and native plantings that also provide opportunity for direct links to Aboriginal culture.

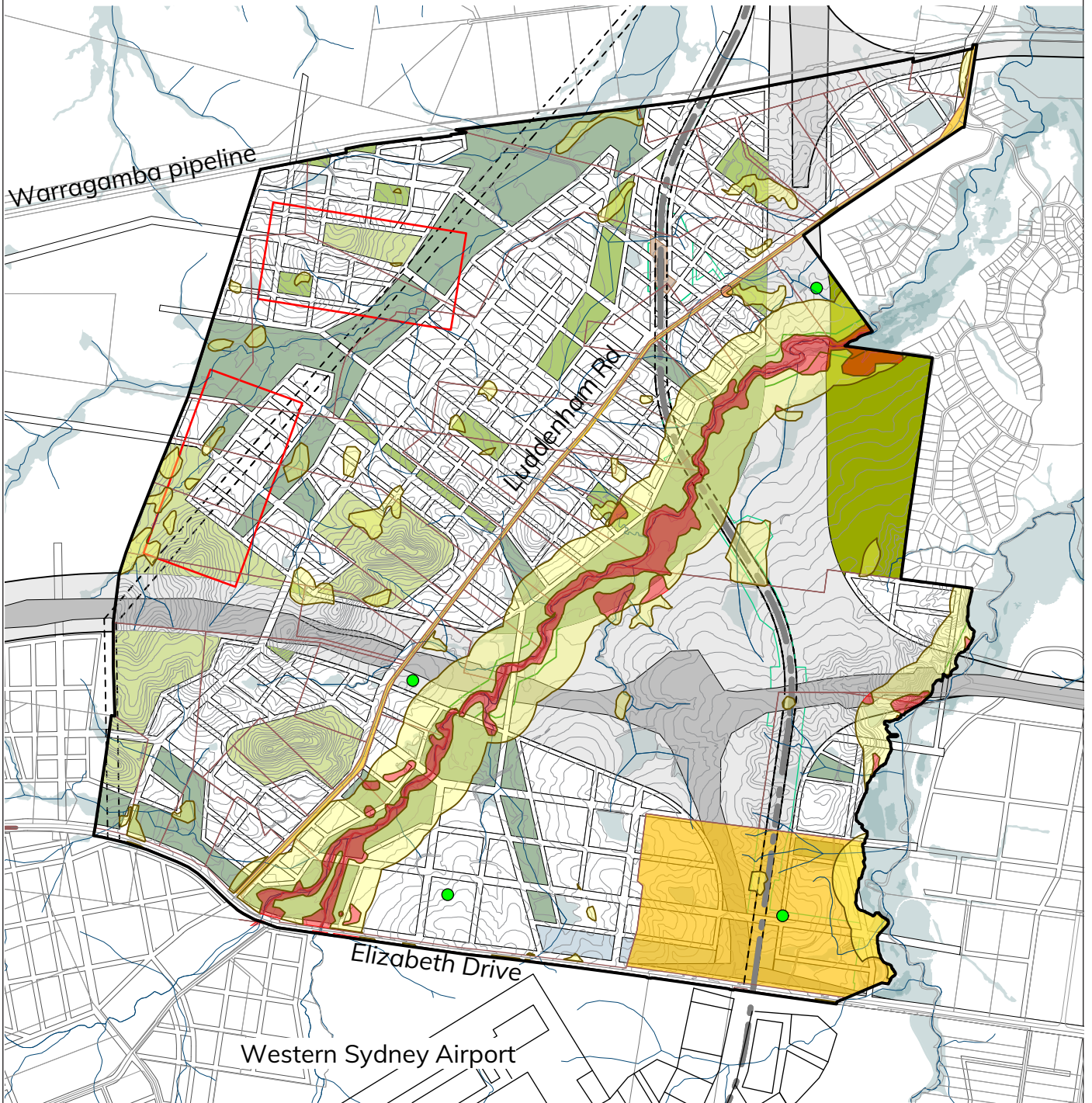
In addition, several Aboriginal artefacts and potential archaeological deposits have been identified and two potential conservation corridors have been mapped. These potential corridors relate to cultural values and show locations where locals and visitors can experience a sense of what the Cumberland Plain was originally like, providing opportunities to connect to Country. These potential corridors have been incorporated into the broader open space network and encompass landforms of ridgeline, spur, hillslope, creek flats, creekline and views. These corridors are indicative only and will be confirmed in the final precinct plans

The former McGarvie Smith Farm, west of Badgerys Creek and north of Elizabeth Drive, is a locally listed heritage item. It is significant for its use as a veterinary research centre for Sydney University since 1936 and contains buildings that demonstrate representative qualities of an Inter-War research facility.

The Northern Gateway also includes four potential heritage places of significance which are to be further investigated, retained and conserved,

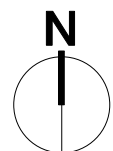
where possible. Of particular importance is the McMaster Field Station, located north of Elizabeth Drive and west of McGarvie-Smith Farm along Cosgroves Creek. The McMaster Field Station was used for pastoral and agricultural research undertaken by CSIRO from the mid-1930s. This experimental farm worked collaboratively with McGarvie-Smith and cultivated fields, built dams, livestock yards, dwellings, farm buildings and other infrastructure such as sheep dips. As such the land was culturally modified for work specific to this agricultural research. For some time, parts of this item were also used in radio-astronomy research.

The farm was the site for early experiments in "keyline design" of dams and creeks by PA Yeomans. This became Yeomans keyline design technique which was developed into a series of publications, such as *Water for Every Farm: A practical irrigation plan for every Australian property*. The technique underpins the permaculture approach. This property is affected by the infrastructure corridor works.



- Cadastre
- Aboriginal Heritage Sensitivity High
- Aboriginal Heritage Sensitivity Moderate
- Proposed street network
- Proposed Riparian Park
- Proposed Ridgetop Park
- Proposed Urban Park
- Proposed Nature Park
- Potential conservation corridors
- LEP Heritage Item
- Unlisted heritage Item
- Listed local significance item

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OPEN SPACE SCENIC VIEWS

The street and park layout have been carefully worked to create a range of memorable and high-quality spaces that connect the urban form to its cultural setting and past.

The creek corridors, which extend into adjoining precincts, will become a generous Green Grid that traverse and connect the various areas around the aerotropolis.

Edged by local streets and connected under the new road infrastructure, they will become favoured walking and cycling routes. The major creeks will be connected by a capillary of second and third order creeks which extend deep into the urban areas. These creeks have historically been dammed for farm use, however the stormwater and infiltration functions will be adapted and renewed to serve the contemporary needs of the Northern Gateway precinct.

The distinctive conical hills in the south western part of the Northern Gateway Precinct have been identified for local parks. These parks will also be edged by local streets, and will allow views across Country,

to the landscape, south to the activity and open expanses of the Airport, and westward to the profile of the nearby Blue Mountains. As their steep grades make them unsuitable for the type of employment uses allowed for under the zoning, their use as local parks will add to the green canopy in the Aerotropolis.

The identified ridgetop parks all have green connections to the creek corridors. This allow opportunities for broader walking and cycling network across the territory and further opportunities to connect to Country.



----- Sydney Science Park Boundary

----- Ridges - currently predominantly open

----- Creek to ridgetop connection through open space (visual and physical)

Open space on hill tops, ridgetops or local high points

Views from hilltop/ridgetop park

----- Creek to creek connection through open space

Views from streets towards the creeks and broader landscape (street grid oriented to terminate on a view towards creeks and ridge line)

Creek riparian corridor with associated vegetation - framing long views

Existing remnant vegetation - framing long views

0 500 1000 M





Aerial view from the north looking south over the Specialised Centre and mixed use area



open space on hilltops with precinct views



Streetscape open space created by earth grid streets. These create a connective undisturbed soil grid



Visual corridors form streets to hilltops and broader landscape



Creek to creek connection through open space and view corridors

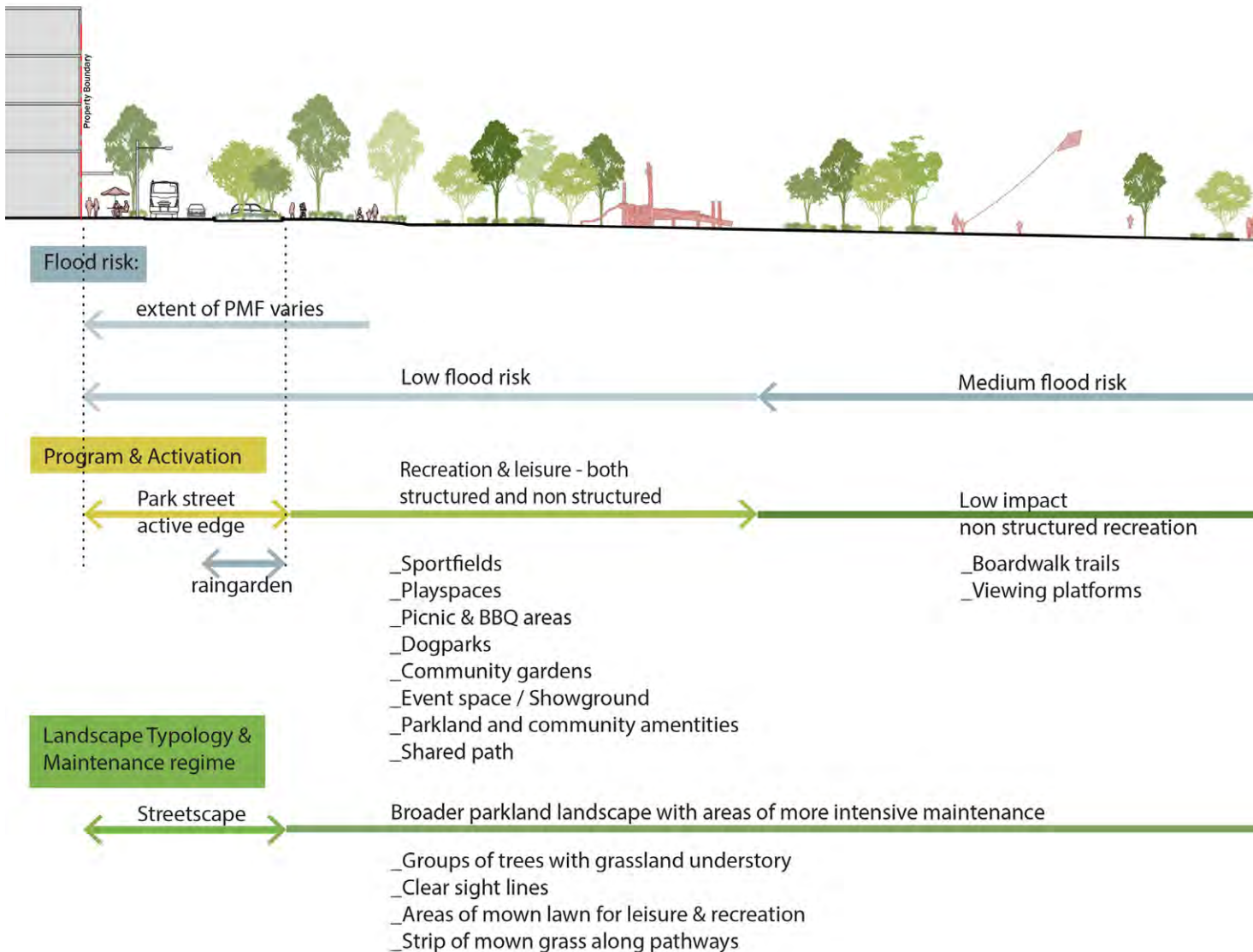


Views from streets towards creeks and broader landscape



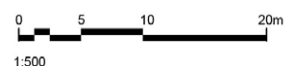
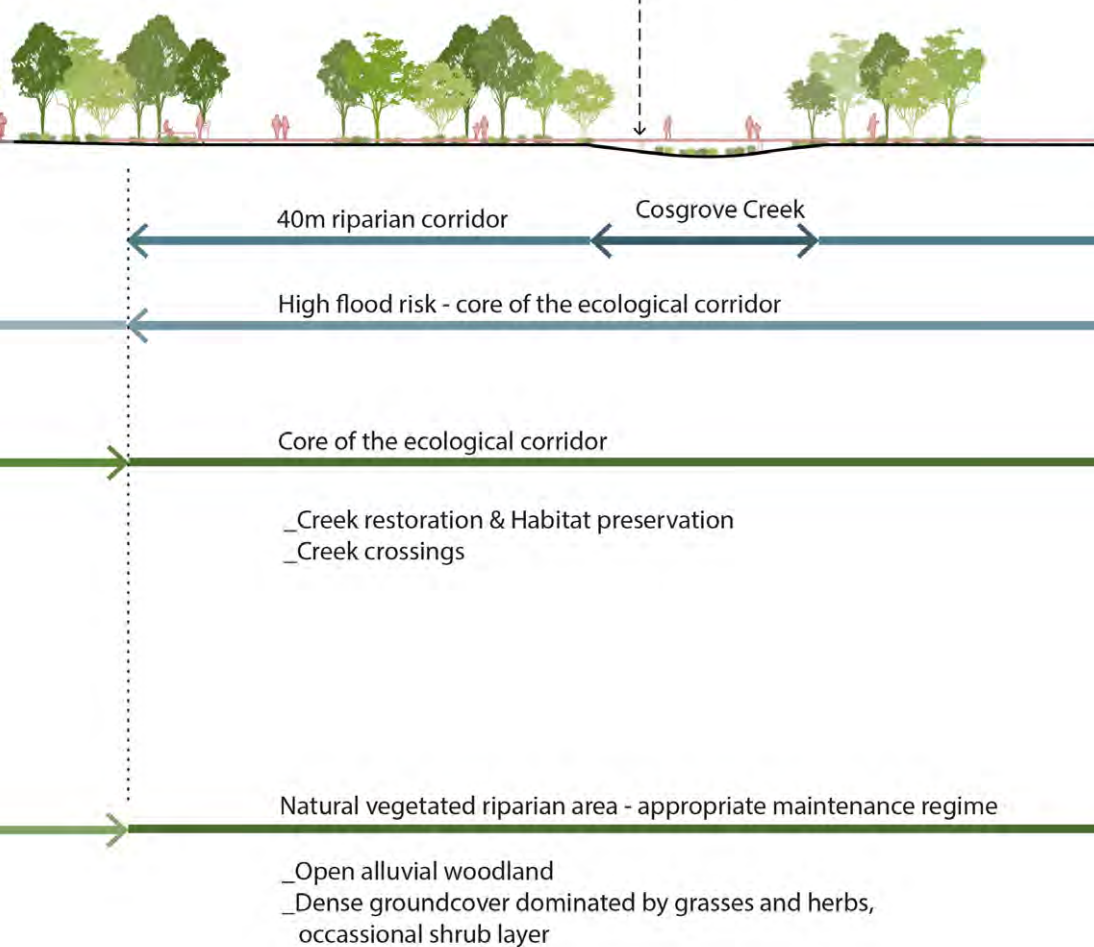
Creek to hilltop connection through open space and view corridors

RIPARIAN PARK SECTION





Boardwalk footpaths and bridge crossings to minimise impact on creek & riparian zone



Cosgroves Creek Riparian Park Typical Section

SPECIALISED CENTRE

The future Strategic Centre is located in the Sydney Science Park, its importance now strengthened by the inclusion of a metro station. This area will become the magnet for public transport provision, jobs and a variety of activities to serve the wider Northern Gateway Precinct.

The urban plan has a connective grid of streets that run off the historic alignment of Luddenham Road to the east. A parallel sister street one and a half kilometres to the west provides local access to the wider precinct, and will become an important bus corridor. Between these two organising streets, and grid of regular streets and blocks is traversed by a major urban park that follows the line of an existing creek as it runs northward through the precinct. The treatment and celebration of water will be a major feature of this generous urban parkland.

In time the area will develop as a compact medium density mixed use precinct, with the higher building forms lining the parklands' edge streets – the opportunity for new models of density combined with amenity.

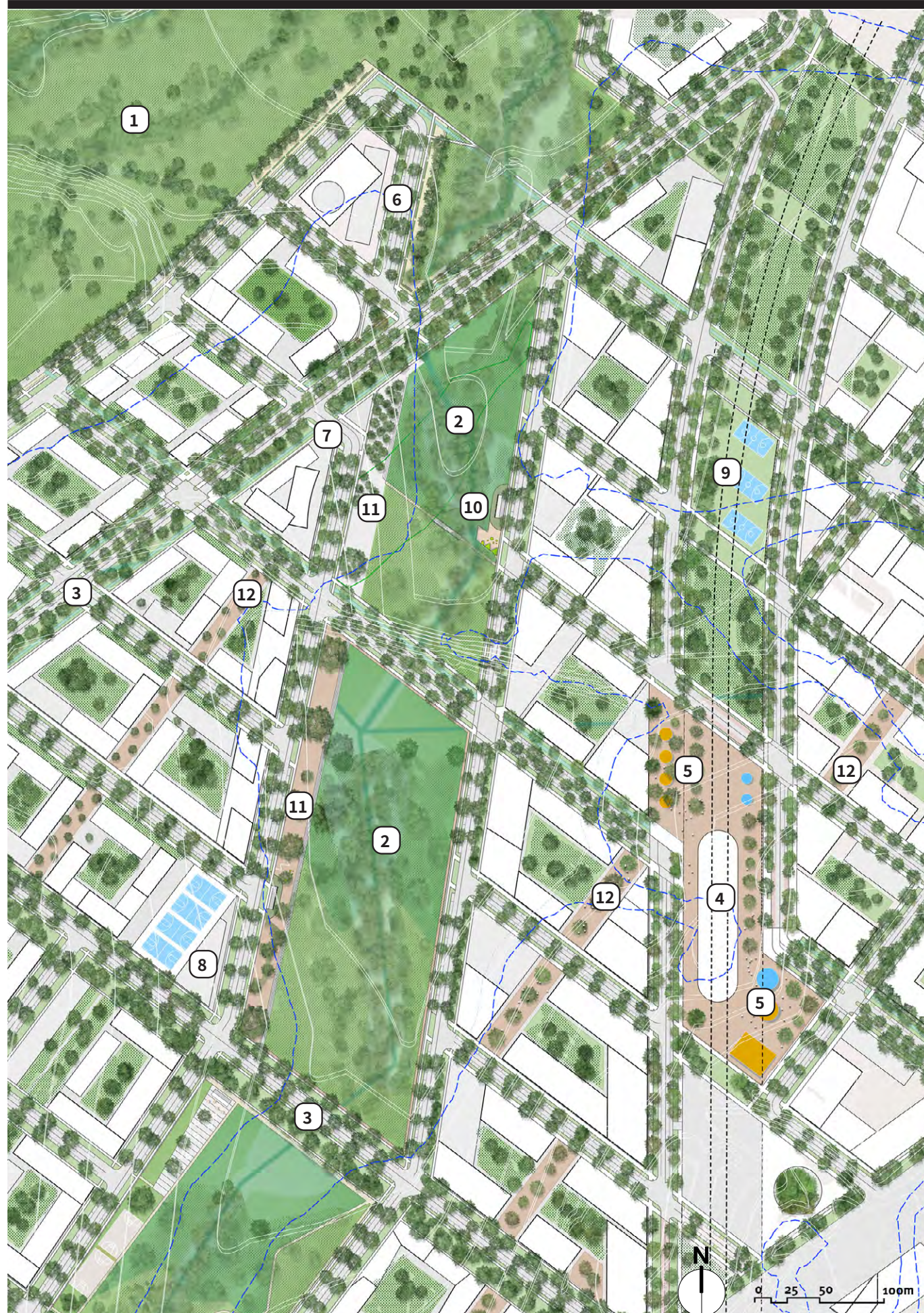


Annotations

1. Riparian park
2. Urban Park
3. Earth grid Street
4. Proposed Metro Station
5. Main square
6. Cultural facility
7. Co-located library and district community facility
8. District Indoor courts
9. Potential location for outdoor courts subject to Metro approvals
10. Playground and associated facilities
11. Linear pedestrian park
12. Mid block pedestrian and cycle links



Artist impression of the new Luddenham Metro station in the specialised centre. Source Sydney Metro





View of the central riparian park within the Specialised Centre



LOCAL CENTRE WITH HILLTOP PARK

The extensive Northern Gateway Precinct will need multiple local centres in addition to its strategic centre around the metro station. These are distributed across the terrain, in relationship to the new streets and parklands, the proposed bus routes and cycleways. The intention is to decrease car dependence and use by providing more local choices for shopping and a range of community and commercial services.

This centre is located along the sister street to Luddenham Road that traverses the precinct, adjacent the place where the distinctive hilltop park connects to the creek corridor park system. A number of bus routes pass nearby, while the parklands and streets incorporate cycleways. The

generous street system has walkable blocks in well-planted and shaded streets – creating an improved environment for the pedestrian.

The parklands are destinations in their own right and will offer a range of recreational opportunities to the future population.



Annotations

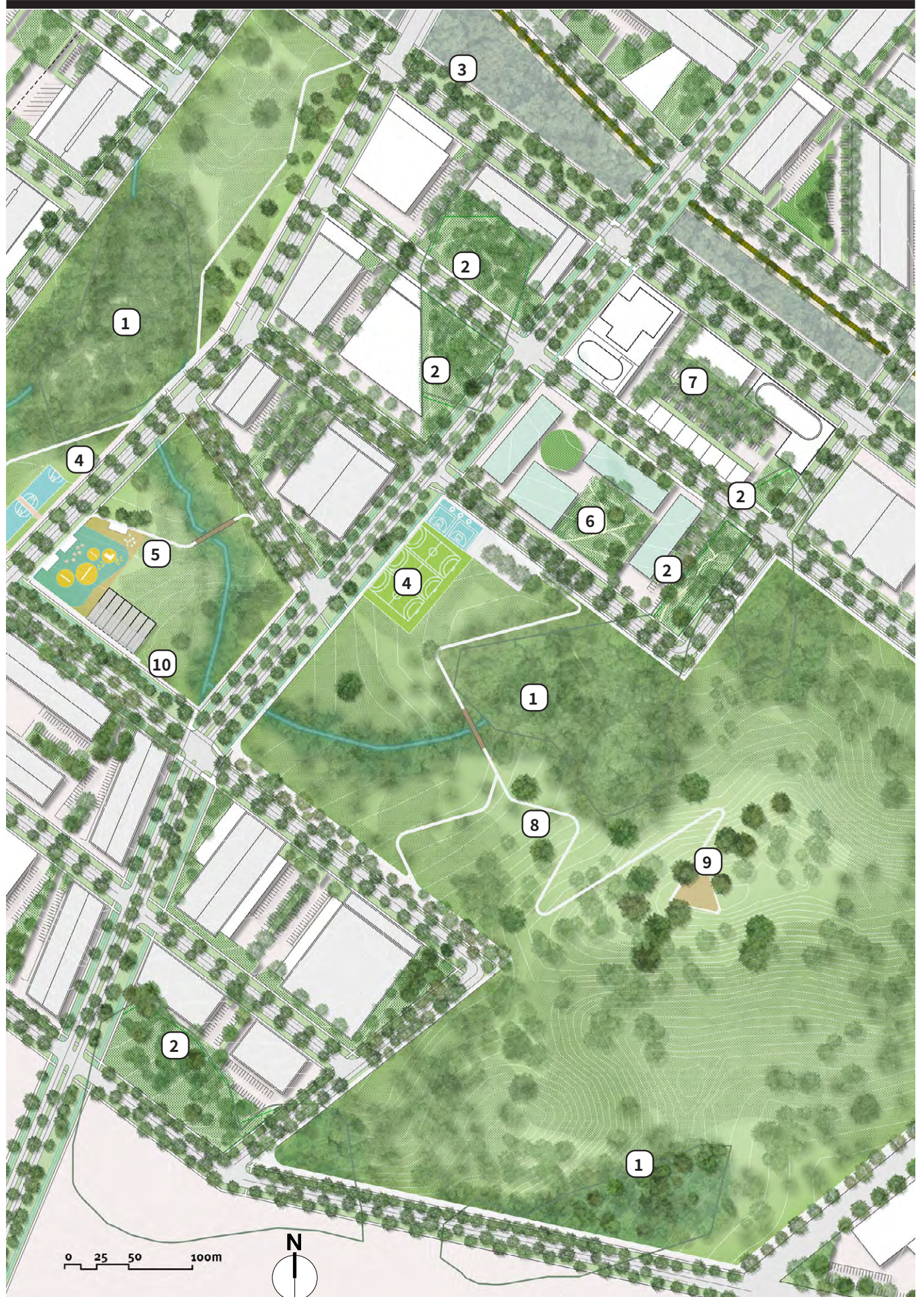
1. Existing vegetation and Endangered Ecological Communities (EEC) incorporated into open space
2. Existing EEC to be incorporated into private open space as part of the open space requirements within lots.
3. Linear park
4. Potential location of outdoor courts
5. Playground and associated facilities
6. Secondary school
7. Local centre (non-residential)
8. Walking trail
9. Lookout
10. Sporting facilities (cricket nets)



James St Market Brisbane - Small scale local centres



Glenmore Ridge - JMD Design





View from hilltop park in the enterprise zone, looking north towards the Specialised Centre.



LARGER SCALE ENTERPRISE AREA WITH RIPARIAN PARK

The areas immediately to the north of Elizabeth Drive will have best access to the airport. These larger blocks are likely in the short to medium term to attract major distribution centres in large format buildings, as has occurred elsewhere across western Sydney. As these uses are prone to give way over time to more land and job intensive uses, it is nonetheless critical to create a broad and connected primary street system, that over time can be augmented by further public connections.

Currently the major creek systems across the area have been harnessed with agricultural dams. These dams are likely to be heavily modified or replaced by a chain of ponds or other innovative water management and treatment systems, all set within generous new parklands that are key to the western Parkland City vision. Rather than watercourses

being left over spaces tucked away behind sheds as is business as usual in many industrial estates, here in the Northern Gateway the parklands will be bounded by public streets, with ecological, landscape and recreational benefits available to all.



Annotations

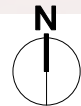
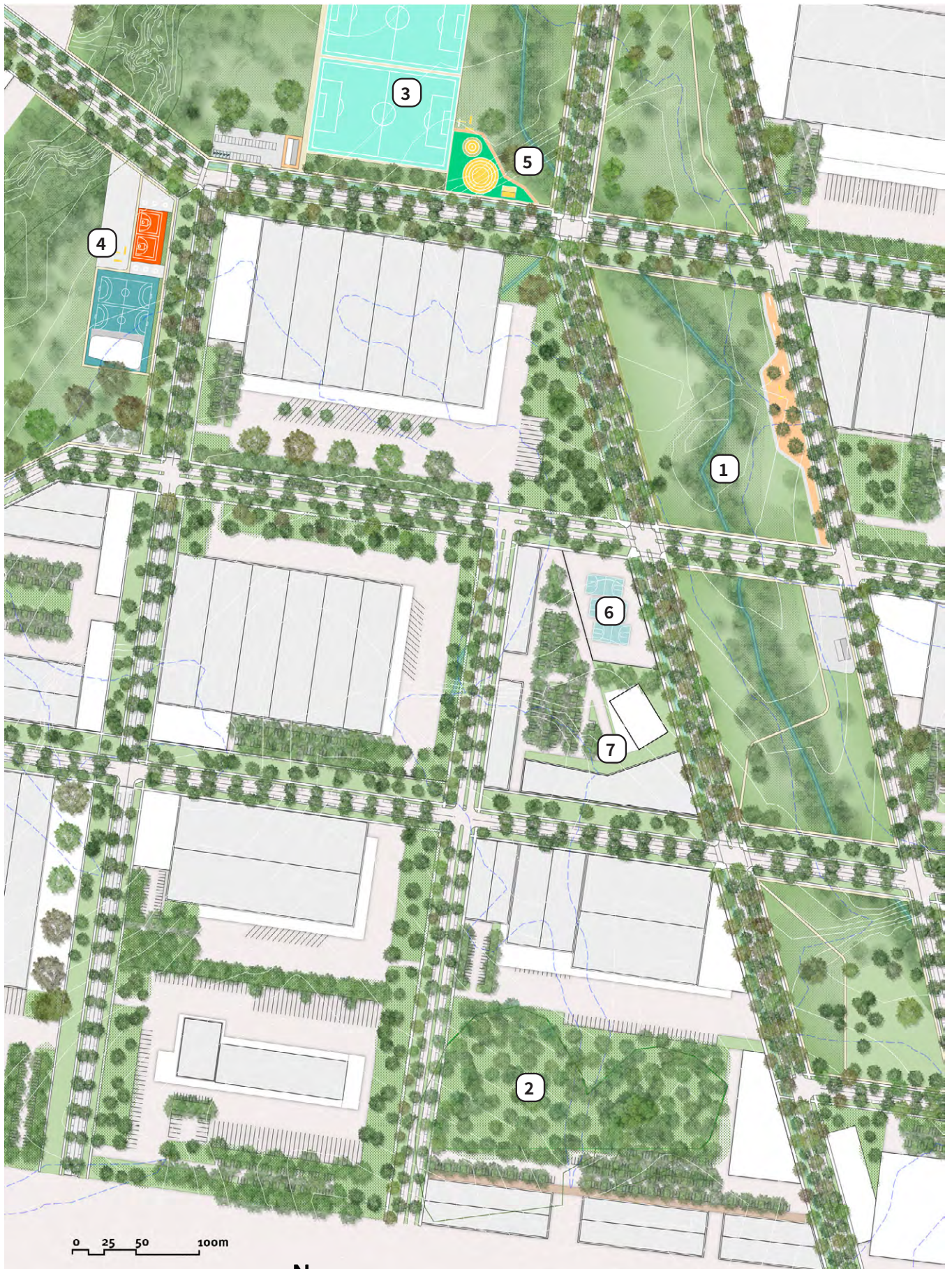
1. Linear riparian wetland park
2. Existing woodland to be incorporated into private open space within lots. This can make up the required percentage of open space.
3. Potential location of outdoor playing fields
4. Potential location of outdoor courts
5. Playground and associated facilities
6. District indoor sports centre
7. Local centre with mix of uses apart from residential.



Oxford Milton - Park Perkins Will



Swiss Research Headquarters - Hadi Teherani



PLANTING STRATEGY

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

Remnant vegetation communities inform the planting palette

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-South Creek, Thompsons Creek and Badgerys Creek corridors.

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 found 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 Western 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.

Planting within wildlife buffer

planting within the wildlife buffer zones to consider implications attracting bird/bats and risk of aircraft strike

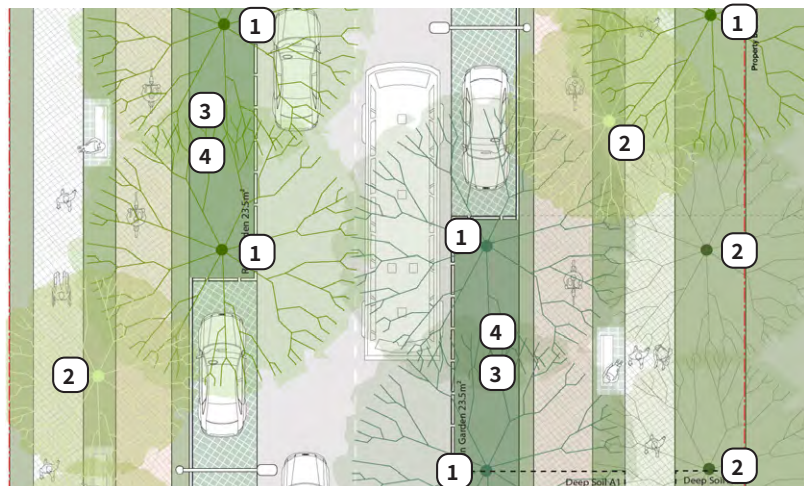
Large and tall trees - the key species of Cumberland Plain - set the structure. The spacing and species selection of the street trees planting is inspired by the Cumberland Plain scattered pattern and therefore it is proposed to be alternating, intentionally planted in a non-boulevard manner.

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 bioretentions.

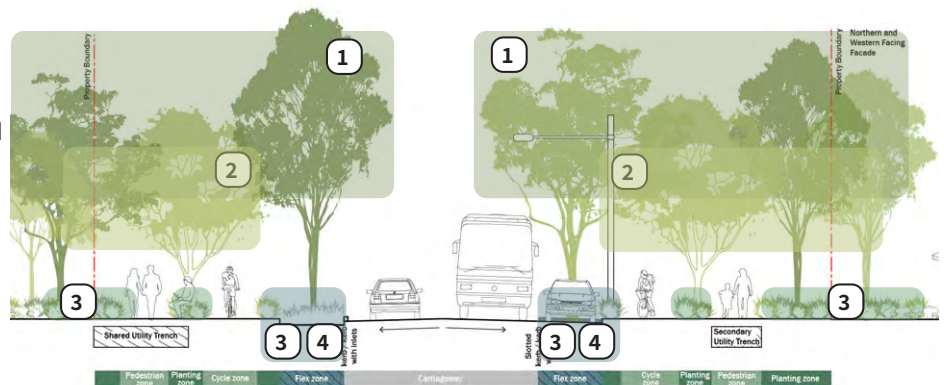
Annotations

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



Sustainability and Resilience

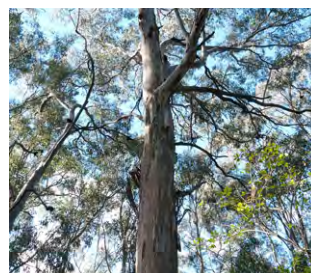
Planting strategy is developed according to water sensitive urban design (WSUD), passive watering and species with low water requirements are proposed.



Spotted Gum



Rough-barked apple



Forest red gum



Textured foliage (Casuarina)



Textured bark (Paperback)



Seasonal interest (Narrow-leaved paperbark)



Grasses (Kangaroo Grass)



Rushes (Marsh club rush)

TRANSPORT INFRASTRUCTURE FRAMEWORK

Movement is fundamental to the economy of the Aerotropolis and facilitating its intended jobs growth. An integrated network across all mode types is to be provided, with a focus on sustainable transport options.



Campbell Section 5, Canberra - Hill Thalys with Jane Irwin Landscape Architecture + Cardno



Constitution Avenue, Canberra - Hill Thalys with Jane Irwin Landscape Architecture and SMEC

MOVEMENT AND PLACE

with Aecom

It is important to note that there are multiple criteria; functional, spatial and environmental, that apply to all streets in the Aerotropolis.

Movement and place is an additional criteria, however it does not take precedence over other considerations.

The objective of Movement and Place is to achieve roads and streets that:

- Contribute to the network of public space within a location, where people can live healthy, productive lives, meet each other, interact, and go about their daily activities.
- Are enhanced by transport and have the appropriate space allocation to move people and goods safely and efficiently and connect places together. Balancing movement and place recognises that trade-offs may be required to achieve a best fit for the objectives

Classification into four street environments, as identified by the GANSW Movement and Place Strategy, provides an understanding of the function and form of a road corridor, where movement and place interact.

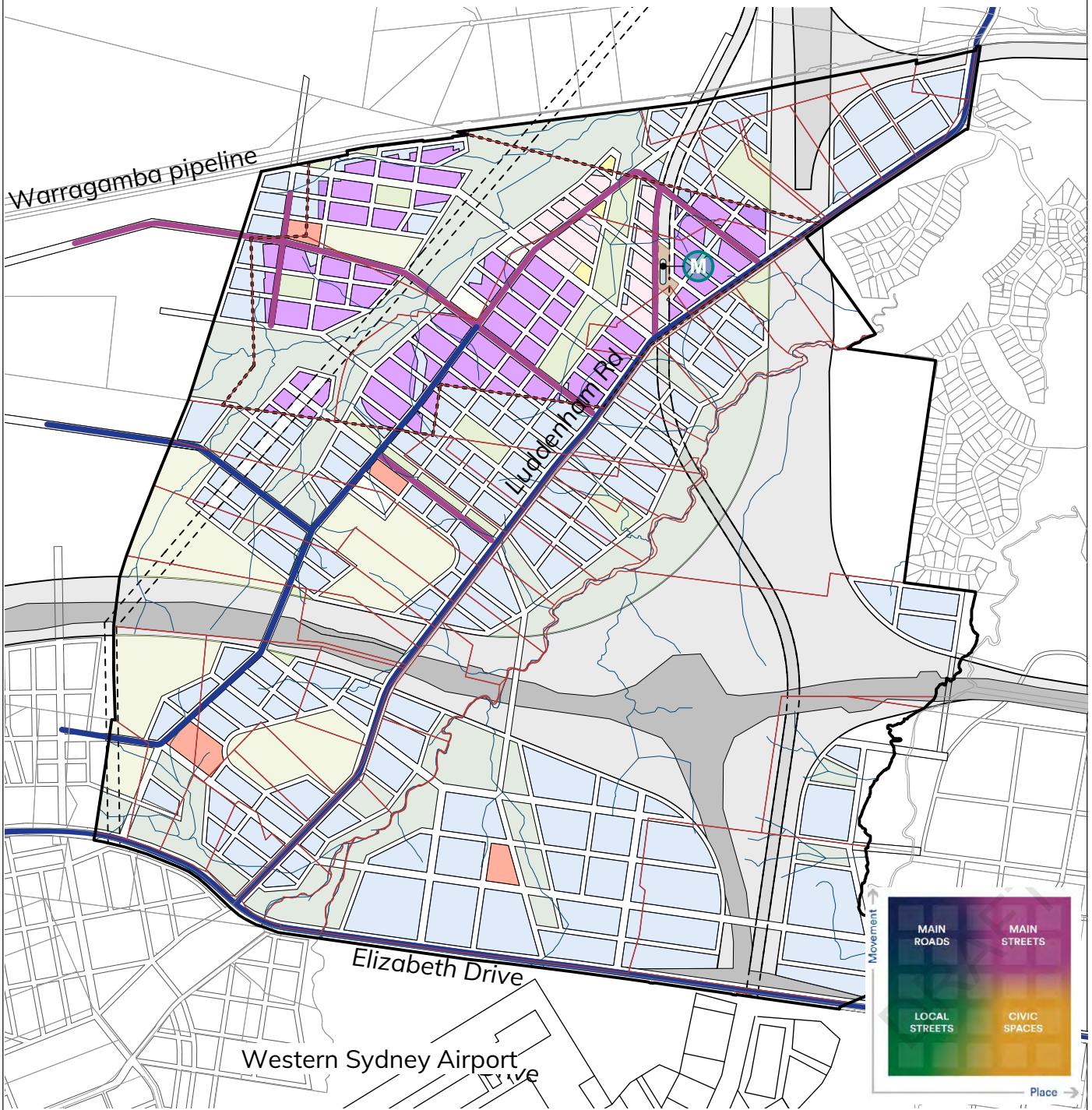
An assessment and definition of the roads and streets within the precincts have been undertaken using the Movement and Place framework, based on the proposed transport plan and land use plan for the Aerotropolis Core, Northern Gateway and Agribusiness precincts.

The Government Architect's Practitioner's Guide to Movement and Place has been referenced for this assessment.

For this stage of the project, an initial classification of the roads and streets within the precincts has been undertaken. This is likely to evolve as key issues and opportunities present for further investigation during the subsequent master planning stages or in the preparation and assessment of detailed development proposals.

The assessment focused on the classification of the Main Roads and Main Streets and Local Streets within WSA. Motorways sit within Main Roads, however as they do not have activated land use adjacent to them, they have been denoted by grey lines for the purpose of this analysis. In addition, Local Streets are not highlighted on the maps as these make up all the streets not otherwise marked.

- Civic Space has been identified in the strategic centre, around the metro station.
- Local Streets provide for local access both outside of centres and within centres.
- Main Streets traverse through areas with greater land use intensity, such as the metro station and mixed use areas.
- Main Roads provide for the strategic sub-regional, regional or metropolitan movement of people and freight within, and between, the precincts, and major land uses. These are formed of 40-metre-wide sub-arterial roads, 60-metre-wide arterial roads and motorways.
- Notwithstanding the above classifications, it is envisaged that all roads and streets within the Northern Gateway Precinct will be planted with connected shaded footpaths and a web of cycleways.



Metro station. Vertical alignment to be confirmed at master planning stage

--- Sydney Science Park Boundary

— Cadastre

— Precinct Boundary

— Main Street *

— Main Road*

— Civic Space*

— Local Street*

□ Proposed street network

□ Proposed Riparian Park

□ Proposed Ridgetop Park

□ Proposed Urban Park

□ OSO/Freight rail corridor

□ M12 corridor

□ Specialised Centre (mixed use).

□ Centre (non residential)

□ Education

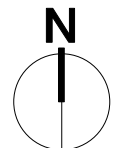
□ Special (public and community)

□ Enterprise

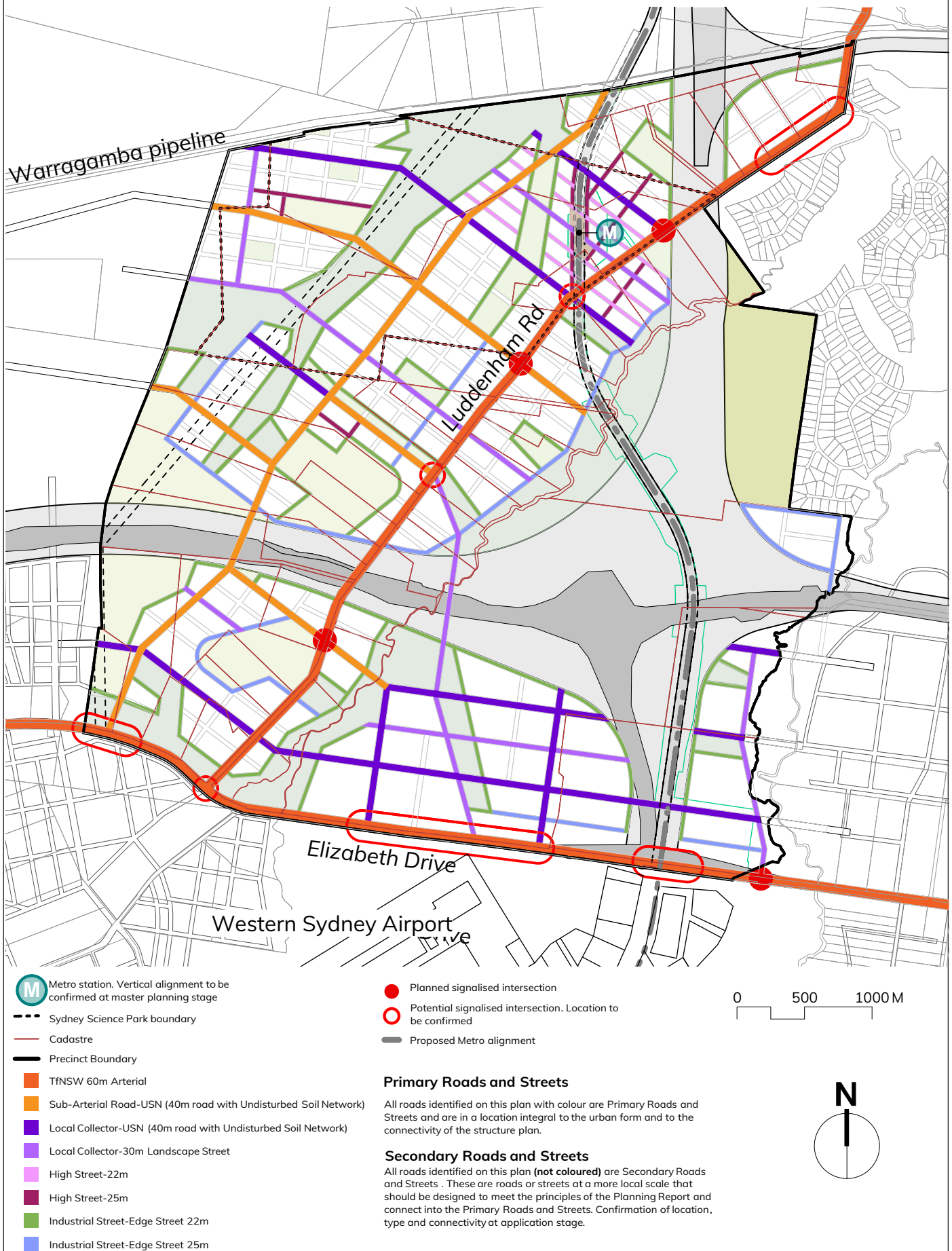
□ Proposed Mixed Use, subject to future master planning

* Classification from the Movement and Place Framework. Government Architects NSW 2020

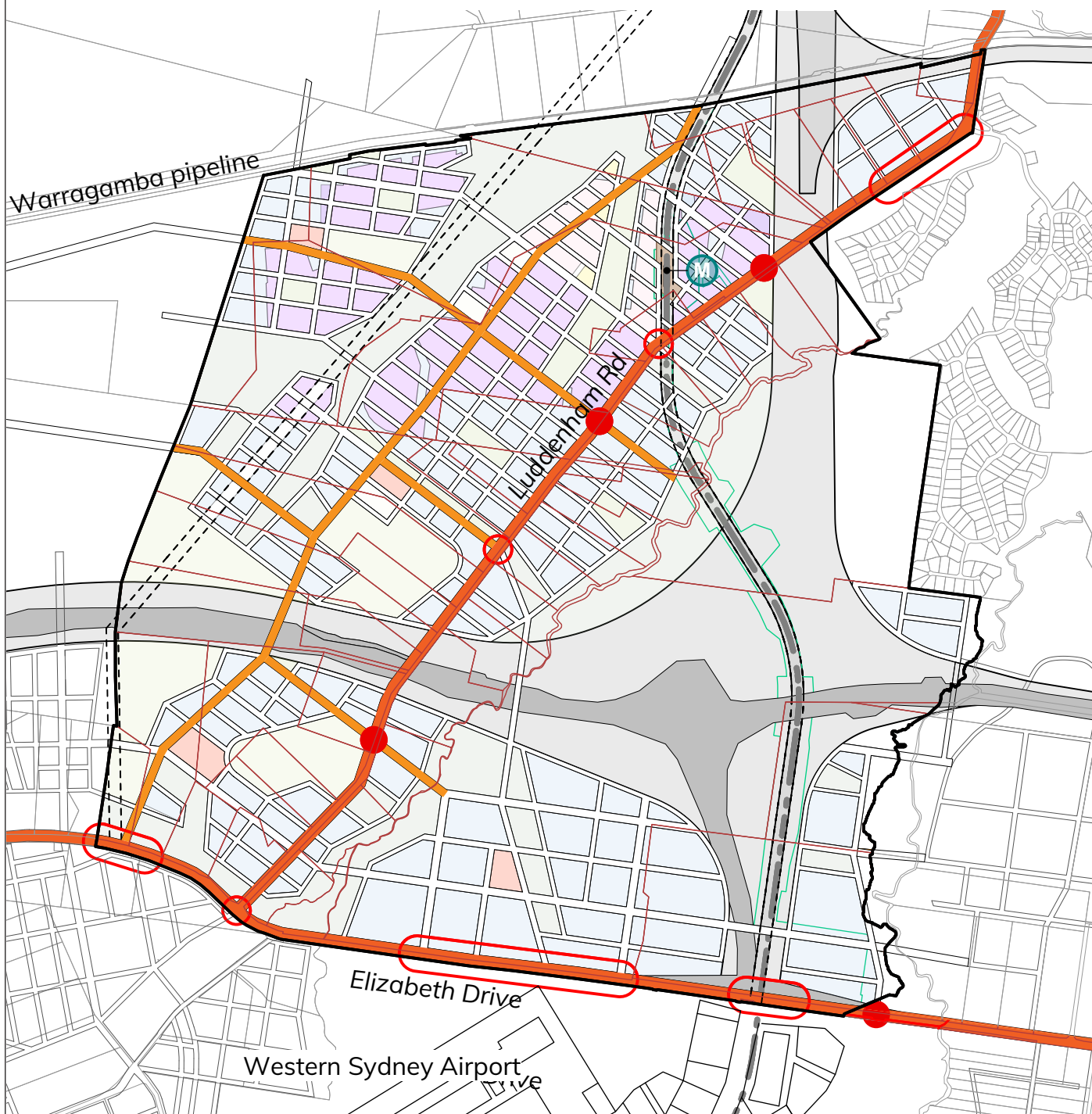
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Primary and Secondary Roads and Streets



Major Arterial and Sub Arterial Roads





 Metro station. Vertical alignment to be confirmed at master planning stage

 Sydney Science Park boundary

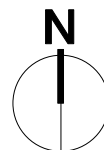
 Cadastre

 Precinct Boundary

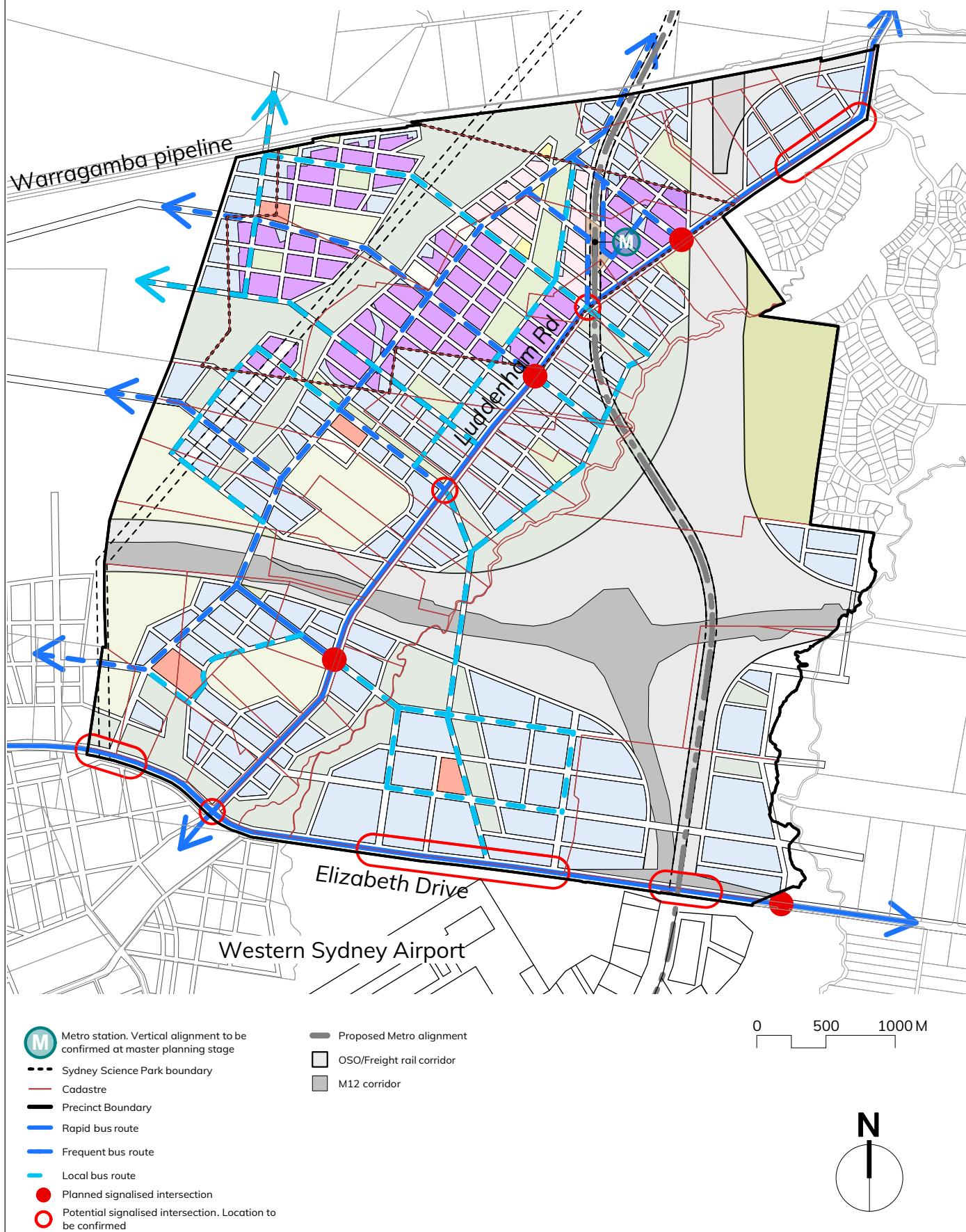
 TfNSW 60m Arterial

 Sub-Arterial Road-USN (40m road with Undisturbed Soil Network)

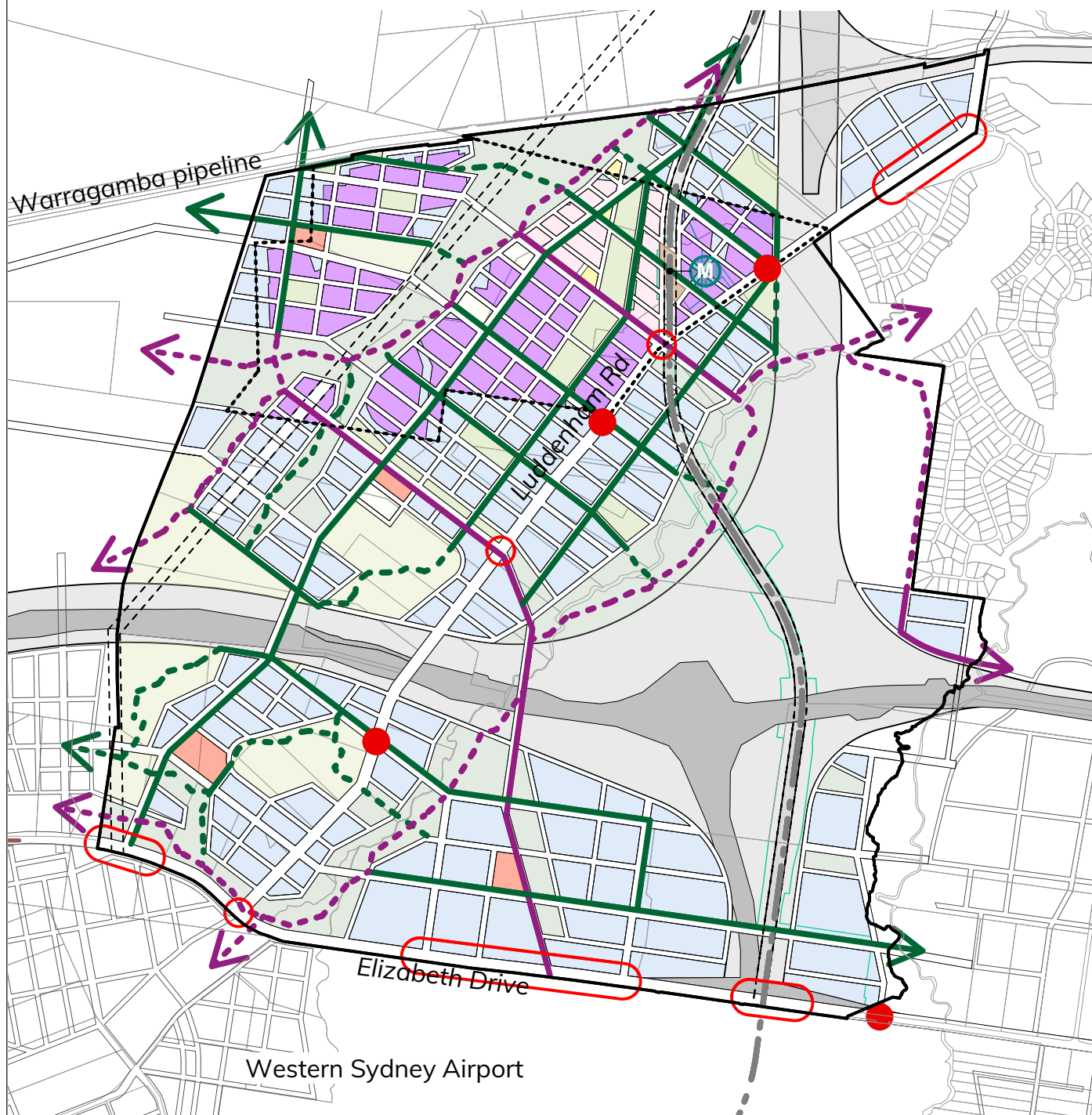
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Public Transport Network



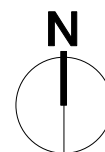
Active Transport Network



-  Metro station. Vertical alignment to be confirmed at master planning stage
-  Cadastre
-  Sydney Science Park Boundary
-  Precinct Boundary
-  Regional, on-street separated cycleway
-  Regional, in-park separated cycleway
-  Local, on-street separated cycleway
-  Local, in-park shared way
-  Planned signalised intersection
-  Potential signalised intersection. Location to be confirmed

-  Proposed Metro alignment
-  OSO/Freight rail corridor
-  M12 corridor

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STREET TYPOLOGIES

It is envisaged that all roads and streets within the Northern Gateway Precinct will be well planted, overhanging tree canopies, connected shaded footpaths and a web of cycleways.

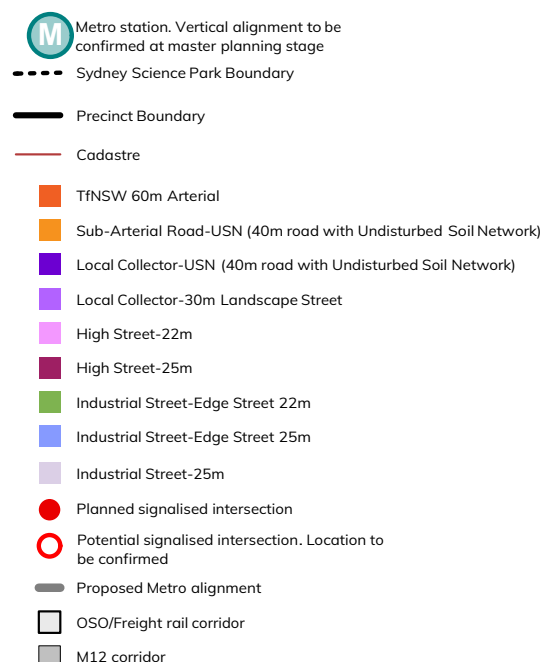
The street typologies in the Northern Gateway are based on the street types outlined in the Western Sydney Street Design Guideline (WSSDG). The broader street reservations that constitute the major urban framework will give structure, legibility and flexibility to the layout, and establish a character intrinsic to the Western Parkland City envisaged by the Greater Sydney Commission.

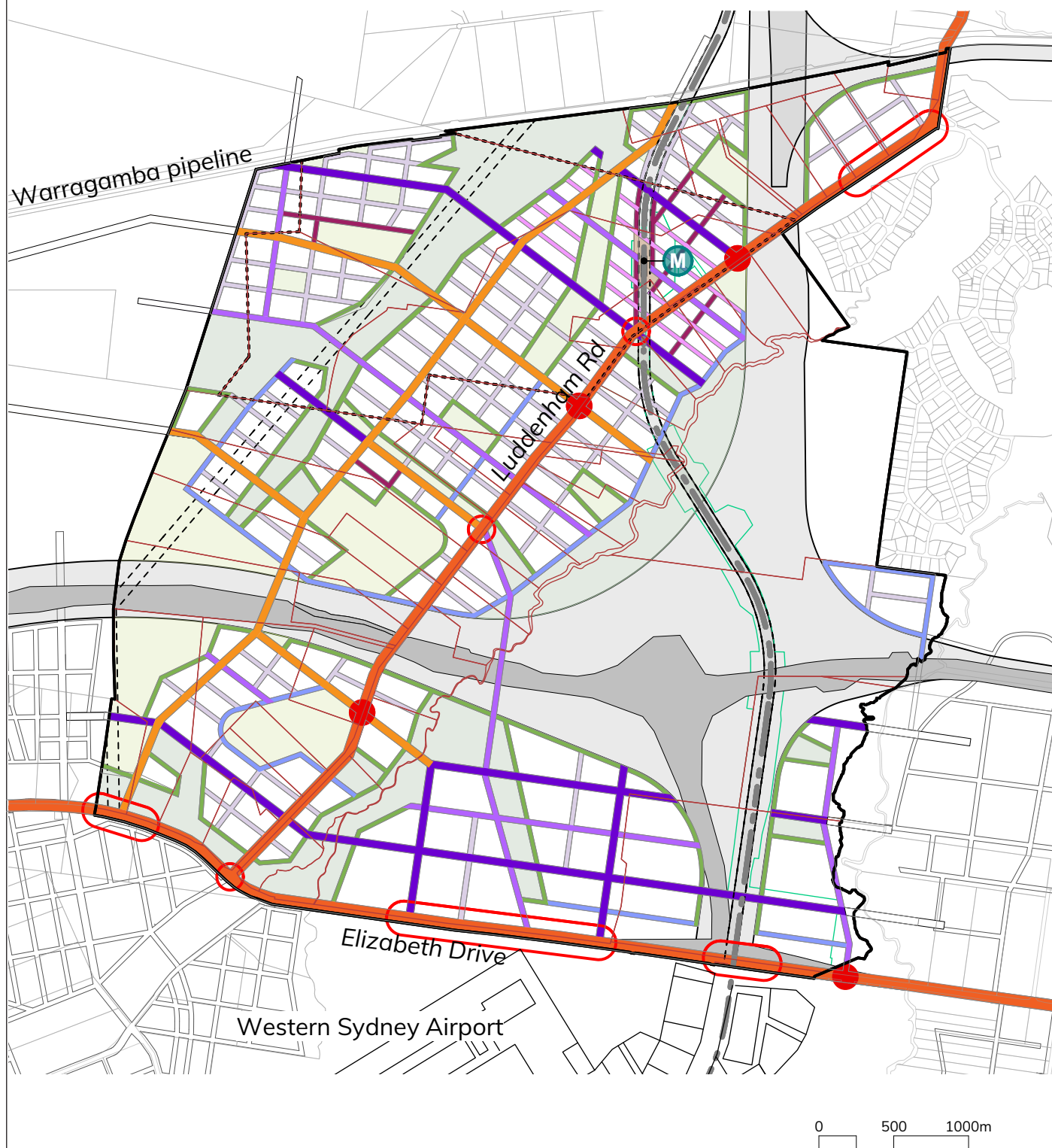
A number of the street reservation widths have been increased beyond those set out in the WSSDG in order to achieve objectives of a landscape-led approach. Specifically the streets' role in realising these objectives include;

- Playing the primary role in achieving the tree canopy target of 40%, enabling maintenance and renewal over the life of the trees;

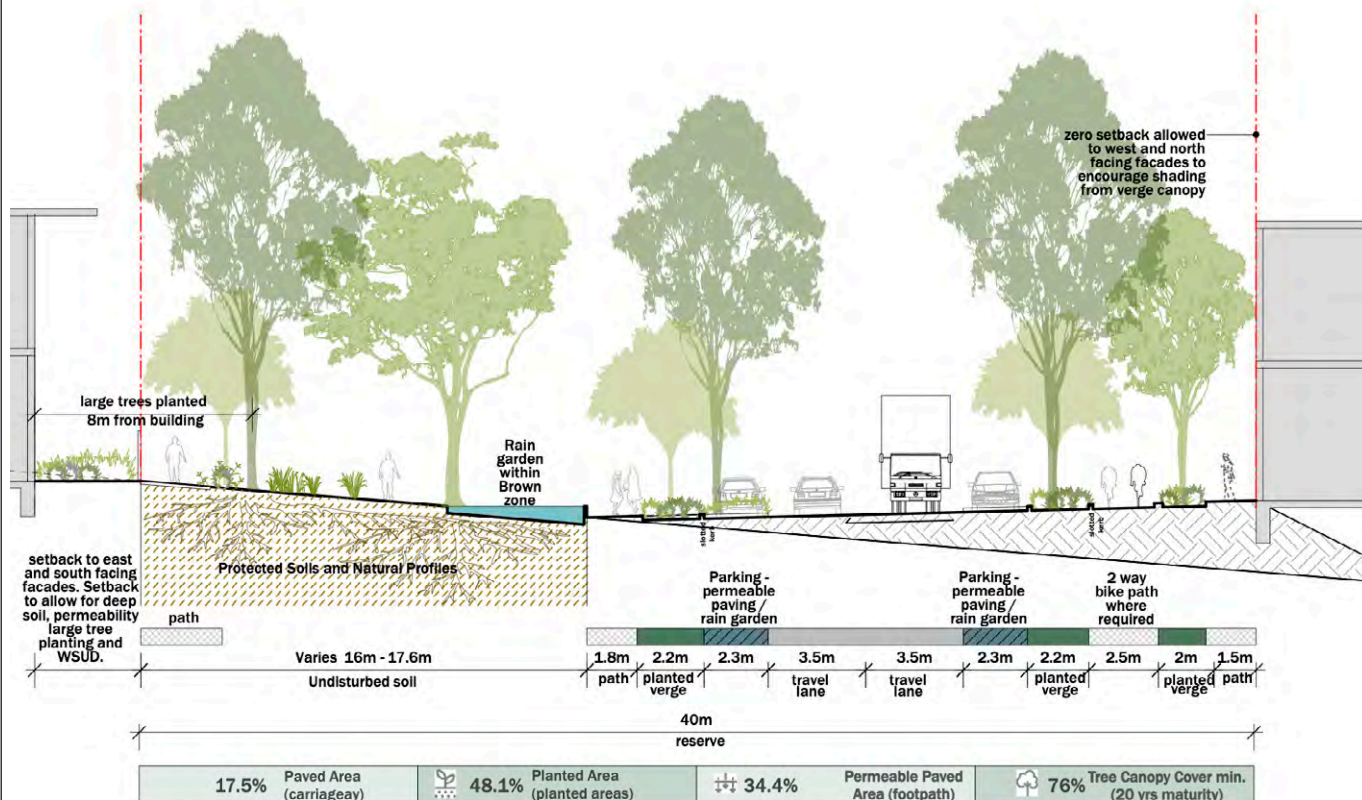
- Protecting undisturbed soil profiles across the Northern Gateway, with the streets connected as system to the hill top parks and creek corridors, allowing better water infiltration, tree growth and ecological outcomes.

In all cases the street cross sections maintain the functionality required by the WSSDG – designation, travel lane, flex zone, parking aisle, footpath and cycle path widths - as stipulated in the WSSDG, for that street type. The street sections reference each of the relevant the WSSDG street types.





Local Collector - USN (40m road with Undisturbed Soil Network)

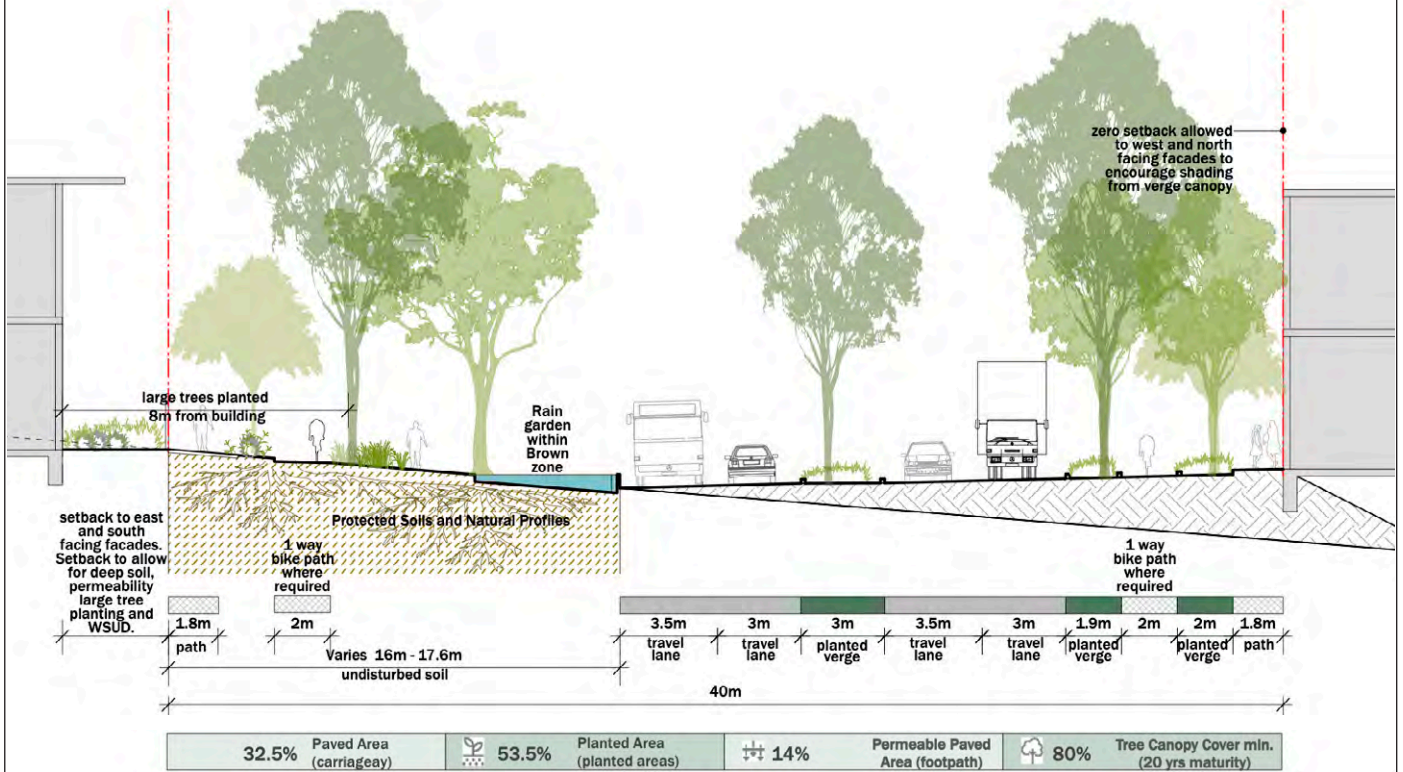


Local Collector - USN (40m street with Undisturbed Soil Network)

- Larger reserve than Western Sydney Street Design
- Guide width to allow for Undisturbed Soil Network (USN).
- Refer to USN Streets p34.

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Sub-Arterial Road - USN (40m road with Undisturbed Soil Network)

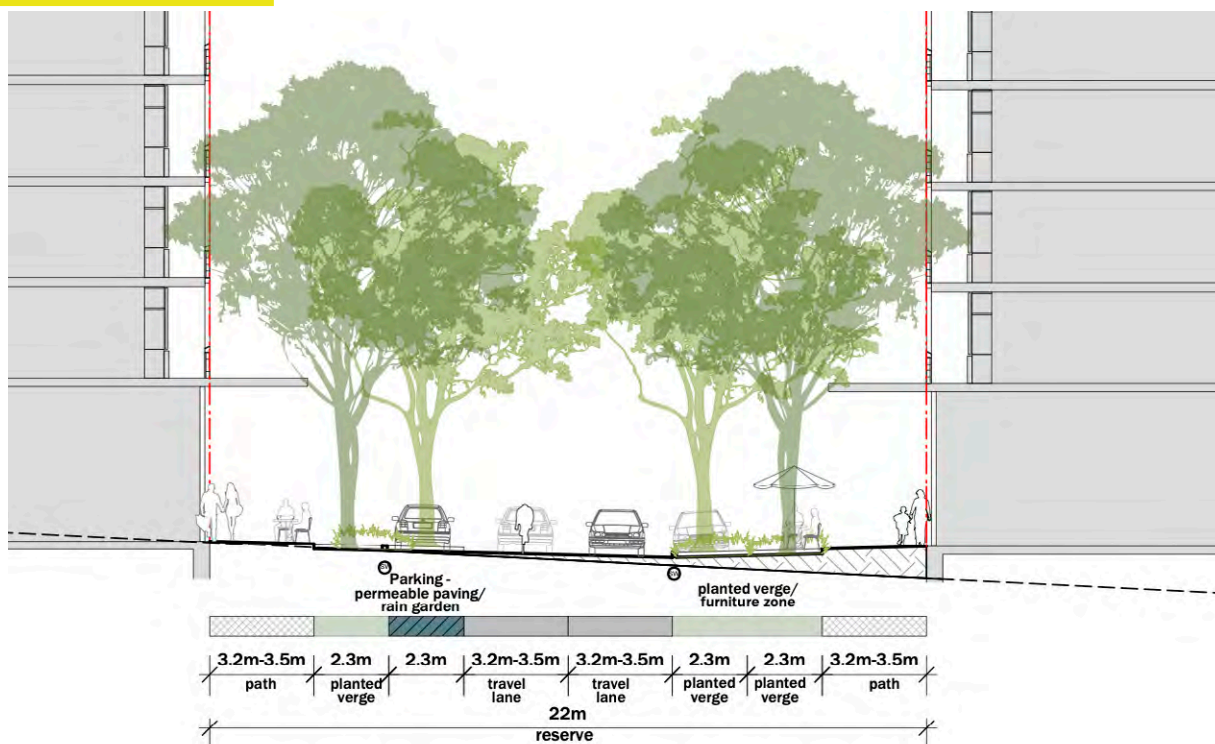


Sub Arterial Road-USN (40m road with Undisturbed Soil Network)

- 40m road capable of frequent bus route as advised by Aecom and width to allow for Undisturbed Soil Network (USN).
- Refer to USN Streets p34.

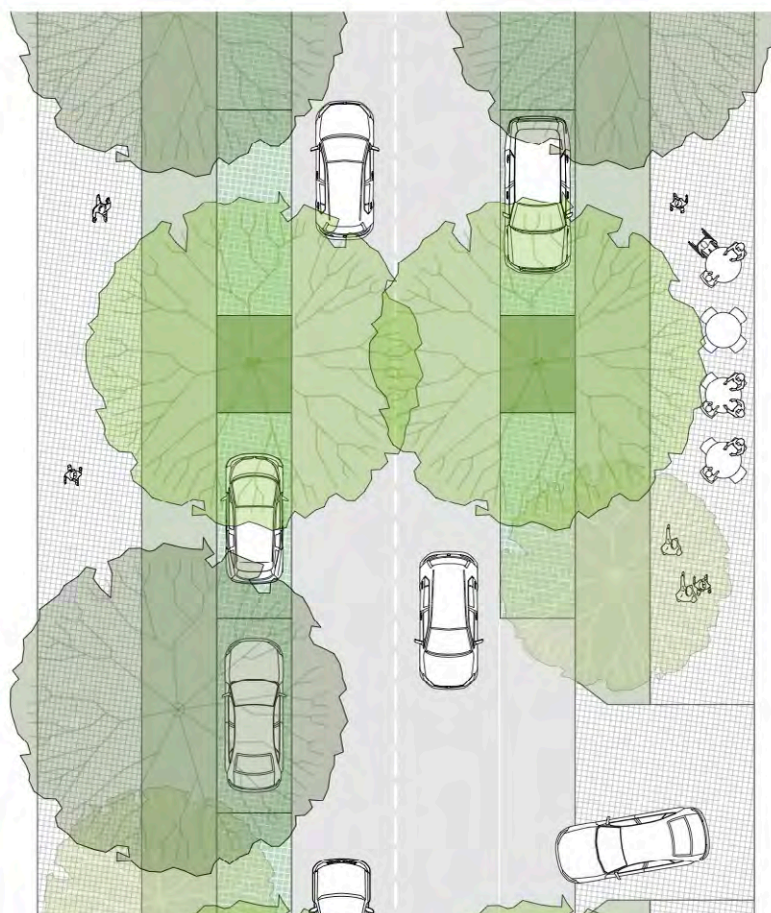
0 5 10 M

High Street - 22 meter



31.9%	Paved Area (carriageway)	18.6%	Planted Area (planted areas)	49.5%	Permeable Paved Area (footpath)	64%	Tree Canopy Cover min. (20 yrs maturity)
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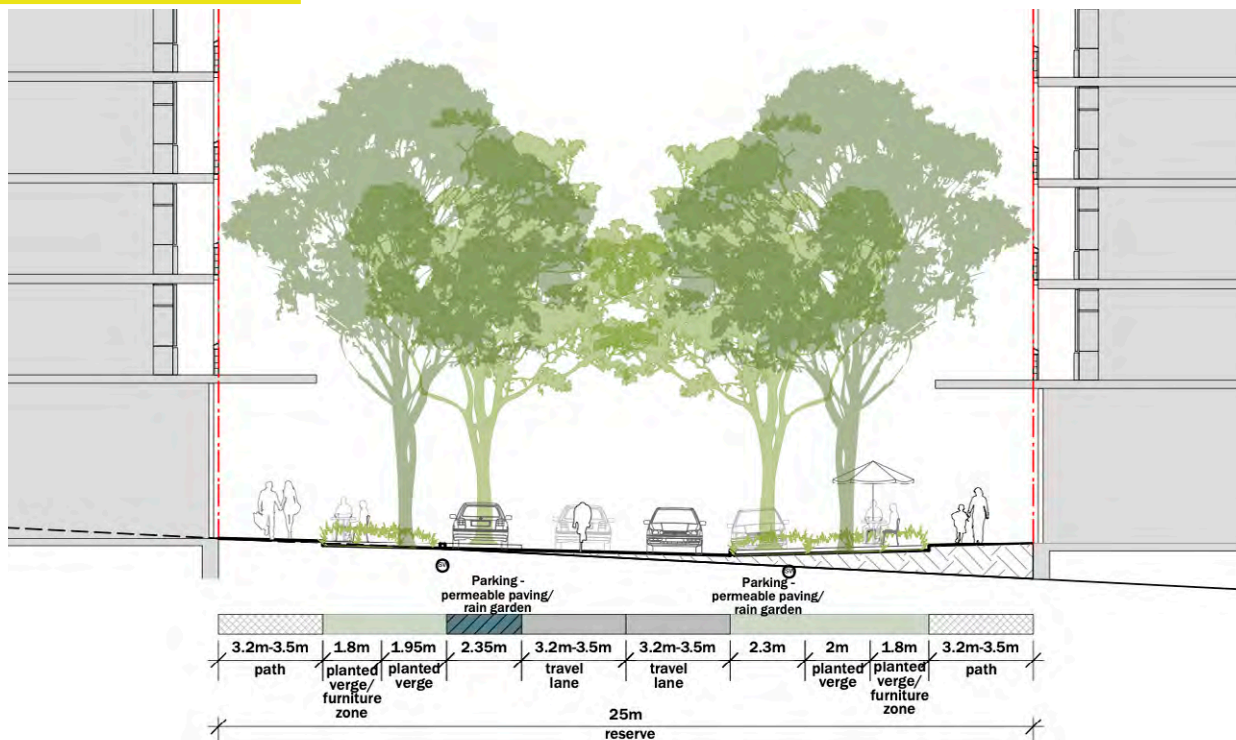
Tree Canopy assumptions used for calculations:
 Large Tree - 10m canopy
 Medium tree - 7.5m canopy
 Excludes tree loss at intersections



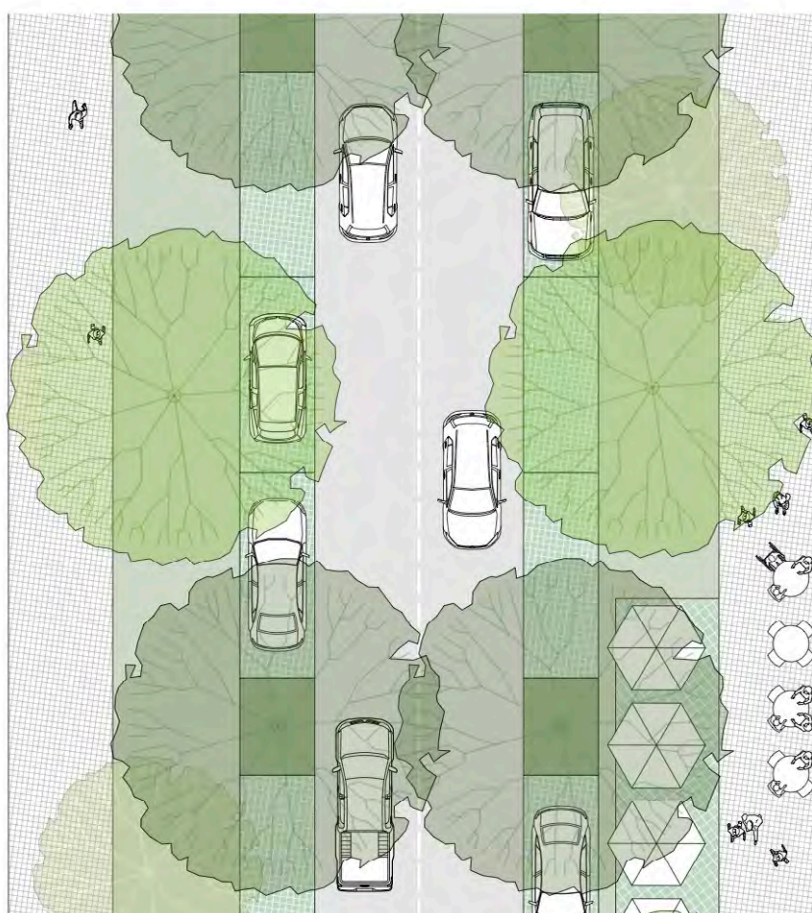
- Western Sydney Street Design Guide
width

0 5 10 M

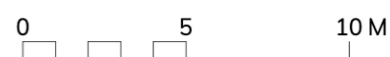
High Street - 25 meter



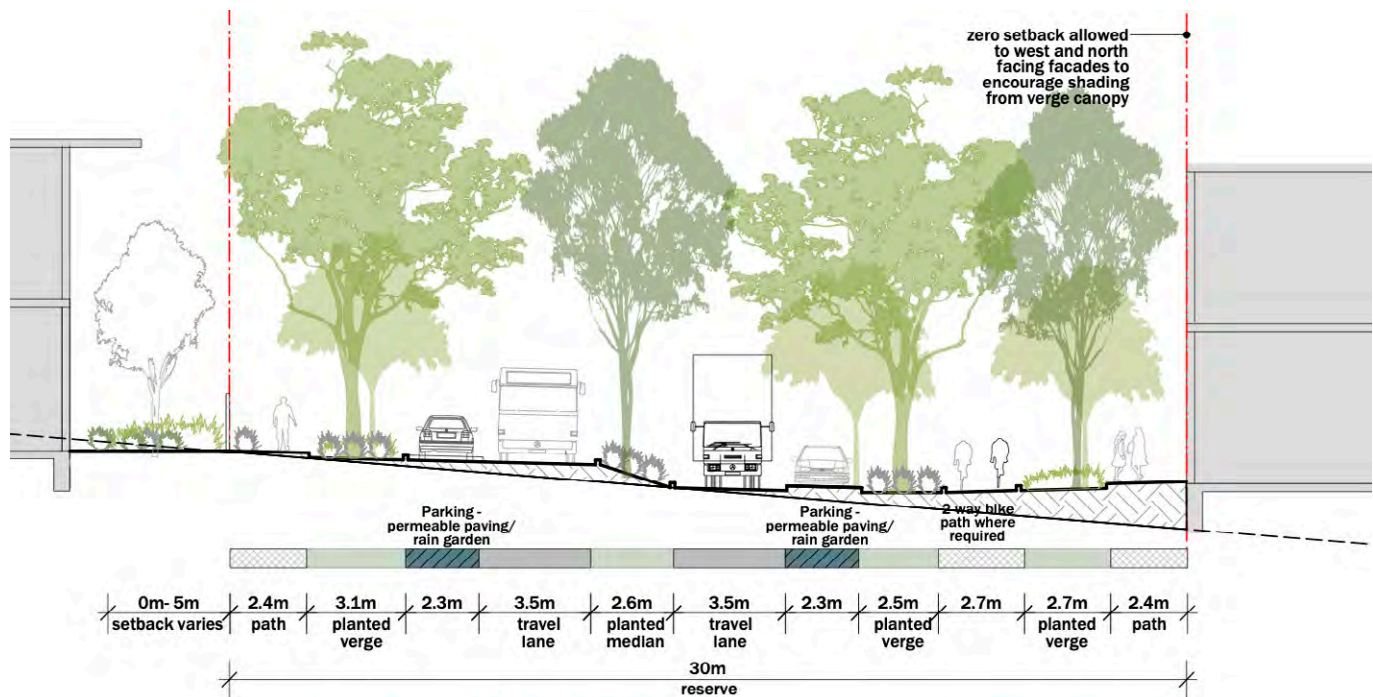
Tree Canopy assumptions used for calculations:
 Large Tree - 10m canopy
 Medium tree - 7.5m canopy
 Excludes tree loss at intersection



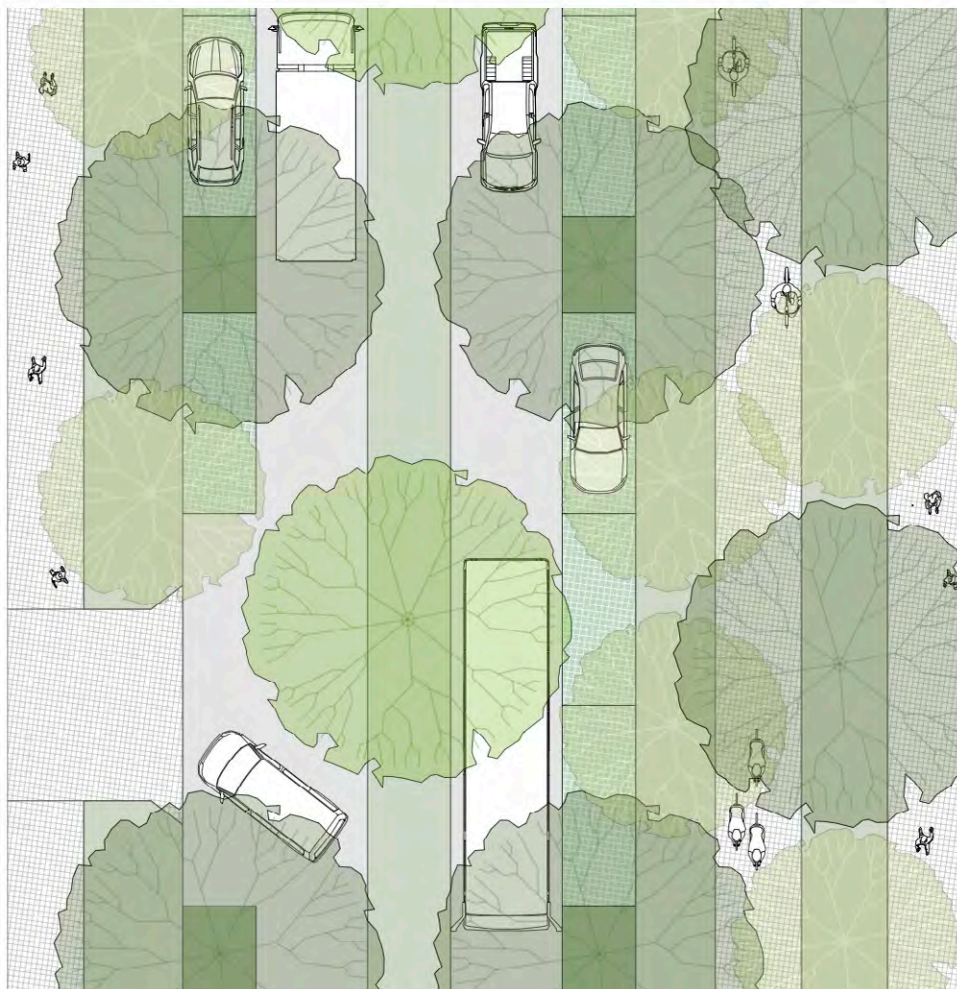
- Western Sydney Street Design Guide width



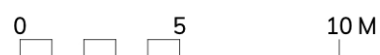
Local Collector - 30 meter collector with sloped median and bike lanes



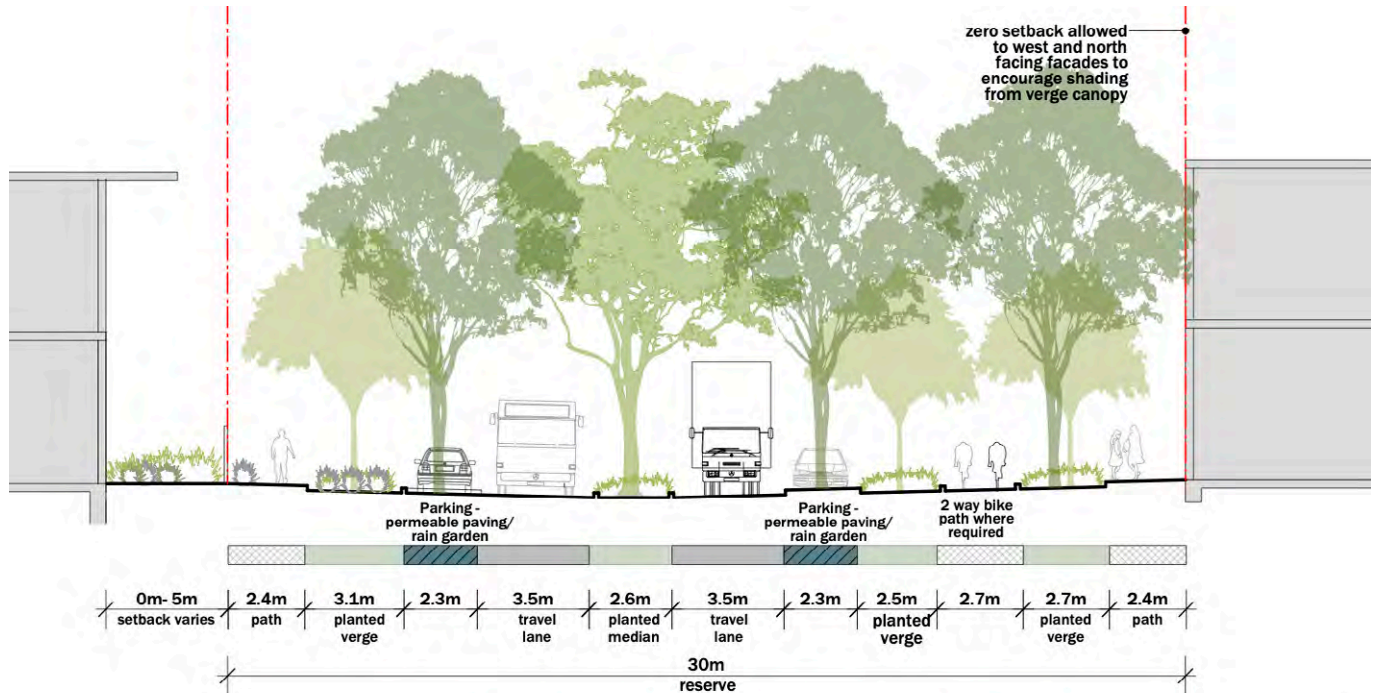
25%	Paved Area (carriageway)	48.3%	Planted Area (planted areas)	26.7%	Permeable Paved Area (footpath, bike paths)	77%	Tree Canopy Cover min. (20 yrs maturity)	Tree Canopy assumptions used for calculations: Large Tree - 10m canopy Medium tree - 7.5m canopy Excludes tree loss at intersection
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- Sloped median on steeper streets to reduce lower embankment within properties and preserve B Horizon

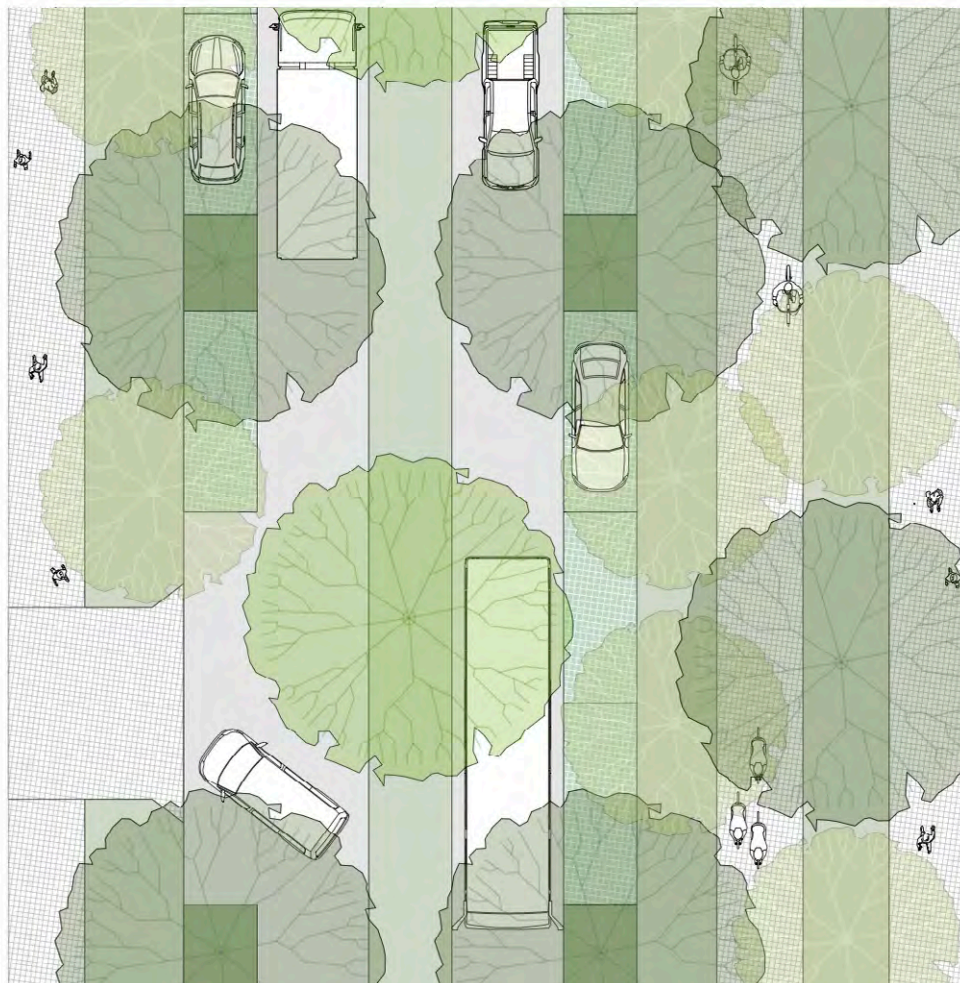


Local Collector - 30 meter collector with median and bike lanes

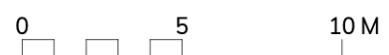


25%	Paved Area (carriageway)	48.3%	Planted Area (planted areas)	26.7%	Permeable Paved Area (footpath, bike paths)	77%	Tree Canopy Cover min. (20 yrs maturity)
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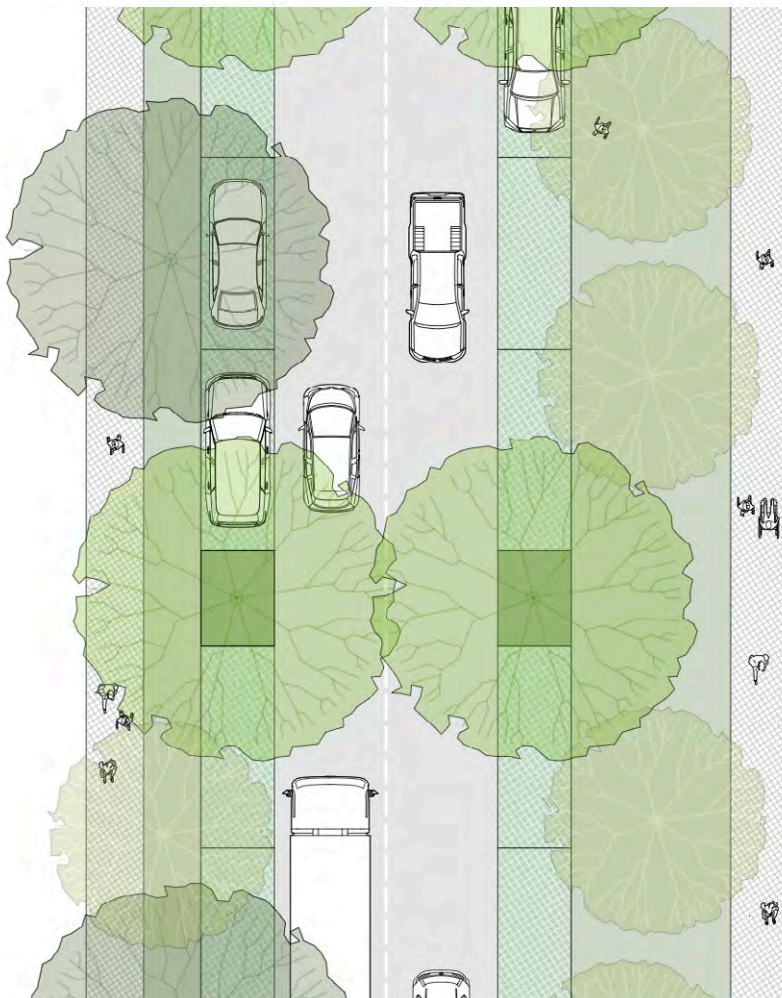
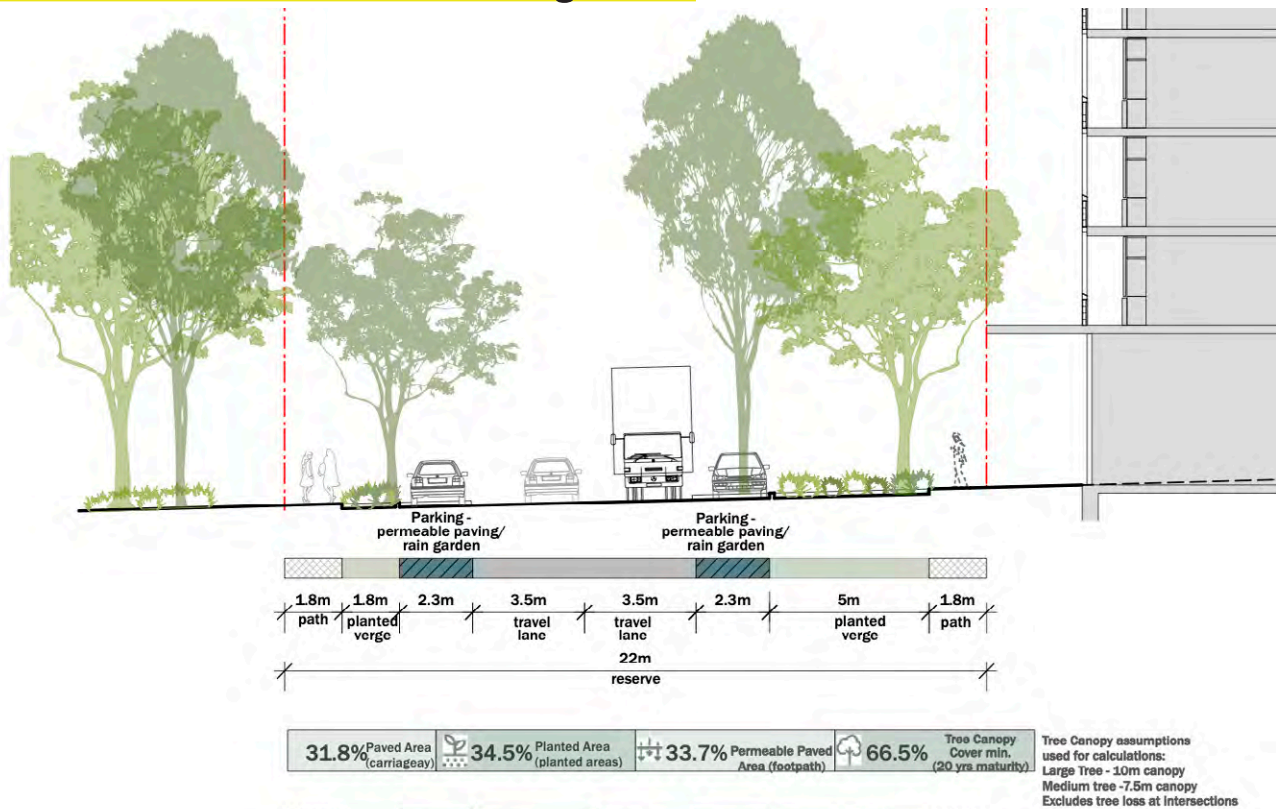
Tree Canopy assumptions used for calculations:
Large Tree - 10m canopy
Medium tree - 7.5m canopy
Excludes tree loss at intersection



- Sloped median on steeper streets to reduce lower embankment within properties and preserve B Horizon



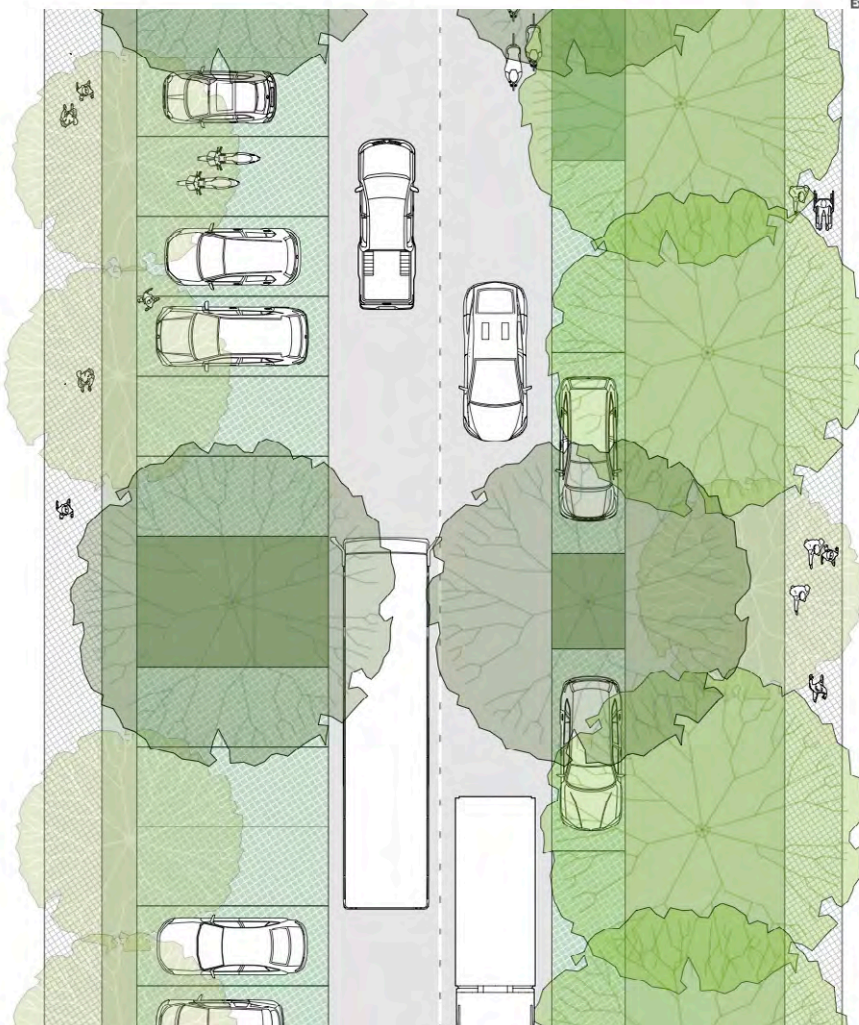
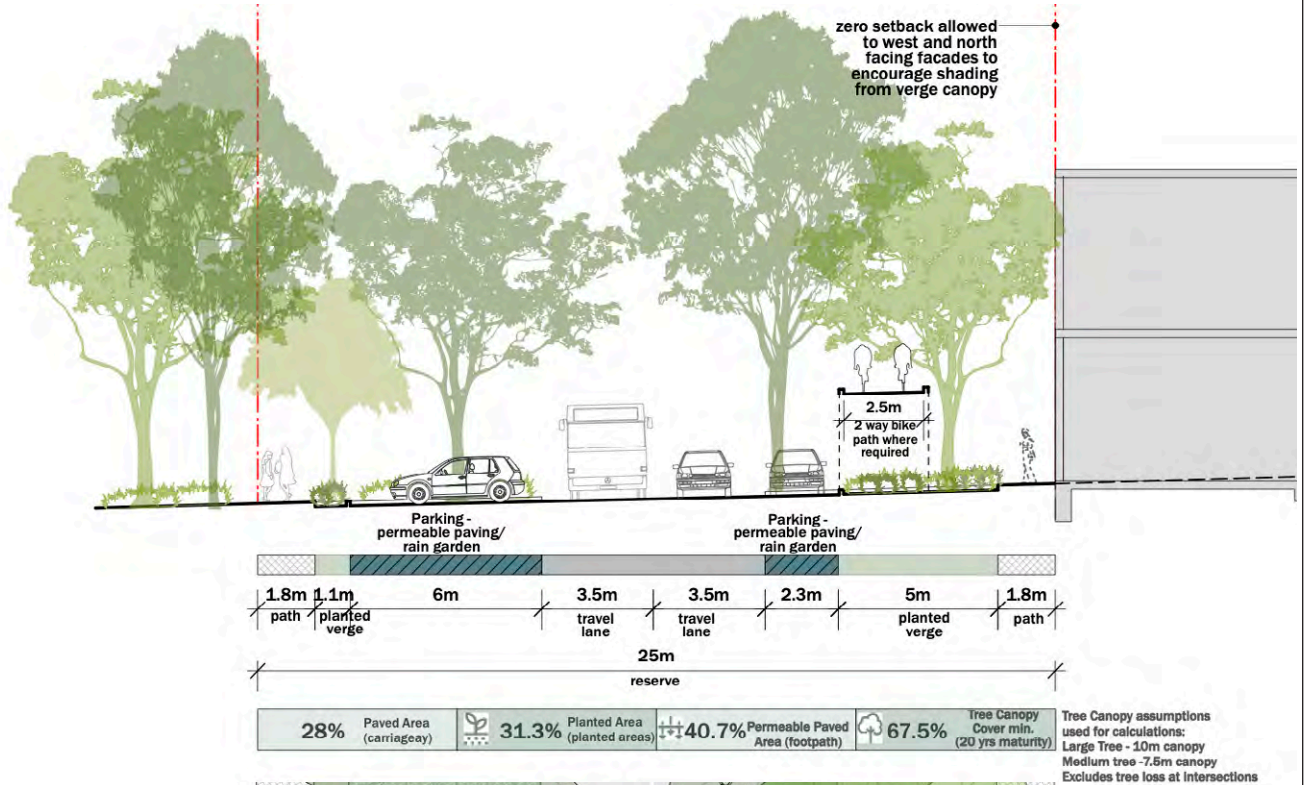
Industrial Street - 22 meter industrial edge street



- Western Sydney Street Design Guide
width

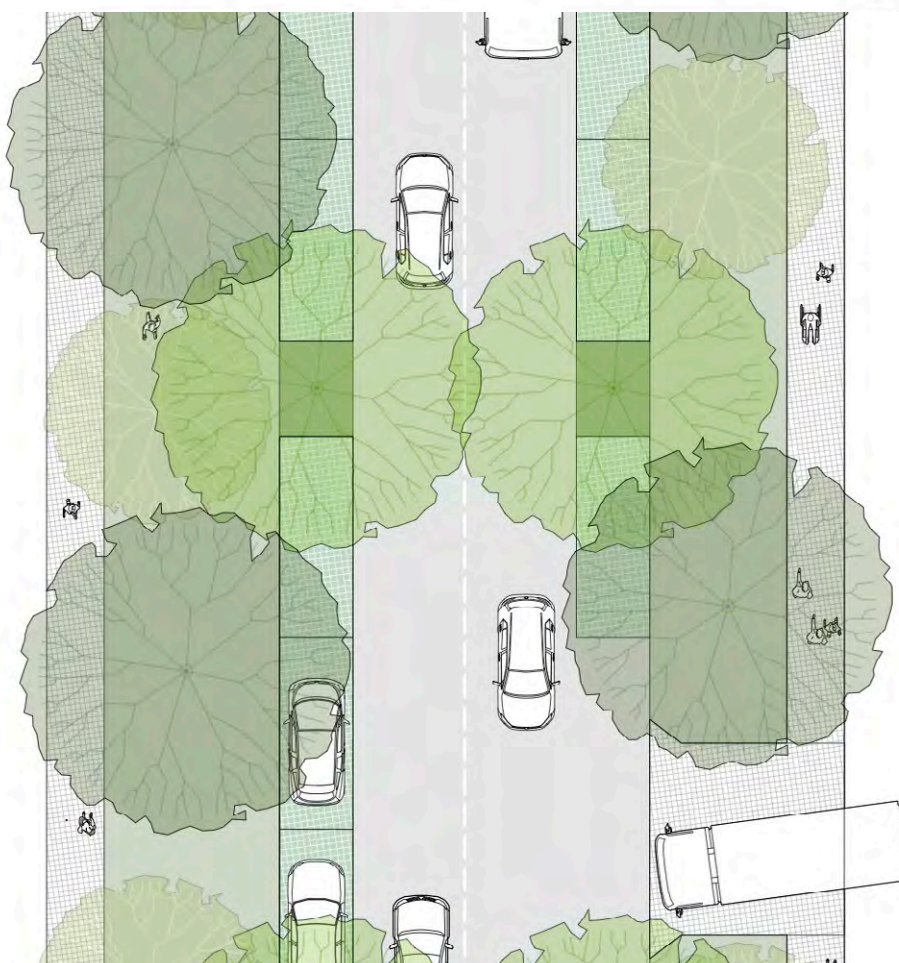
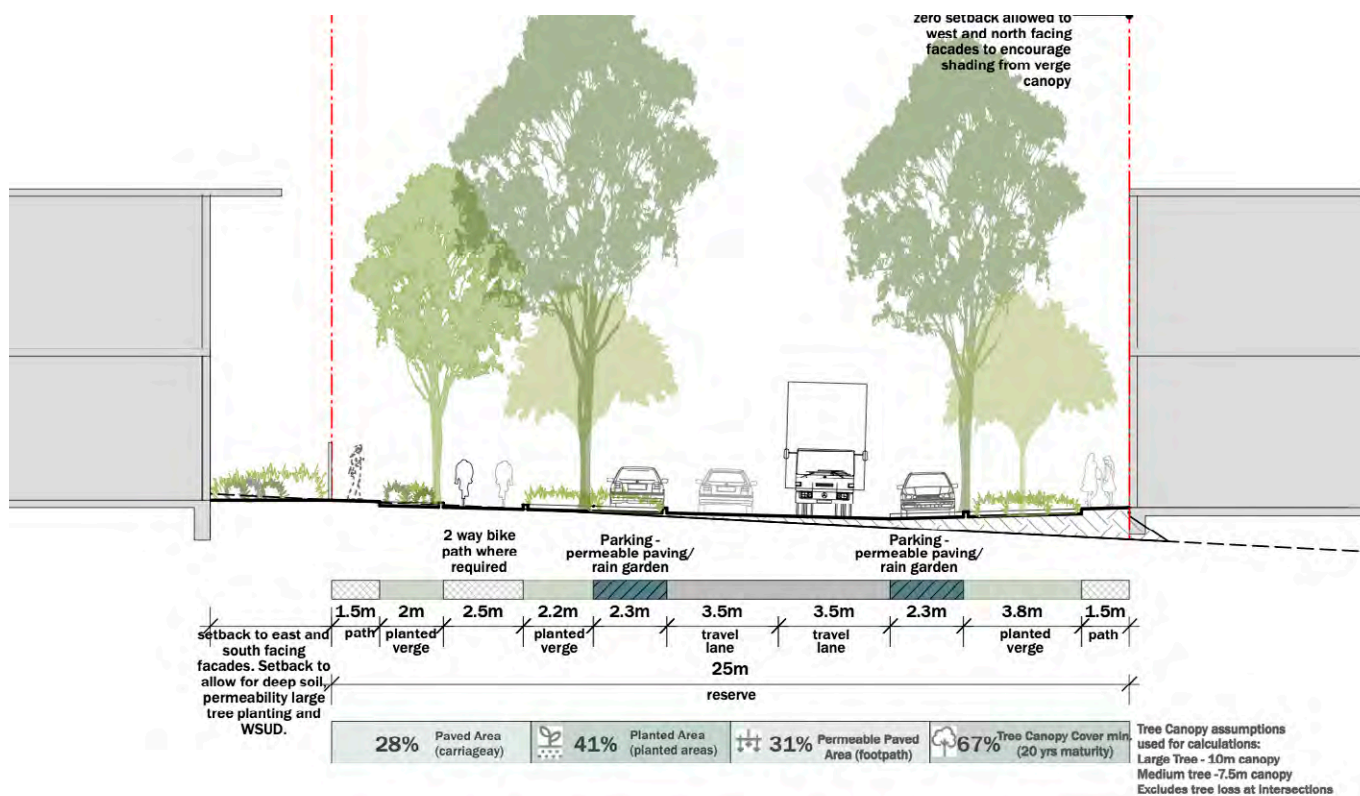
0 5 10 M

Industrial Street - 25 meter industrial edge street



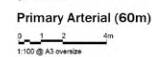
- Bus capable road as advised by Aecom

Industrial Street - 25 meter



- 3m additional verge planting to the Western Sydney Street Guidelines to increase canopy cover.

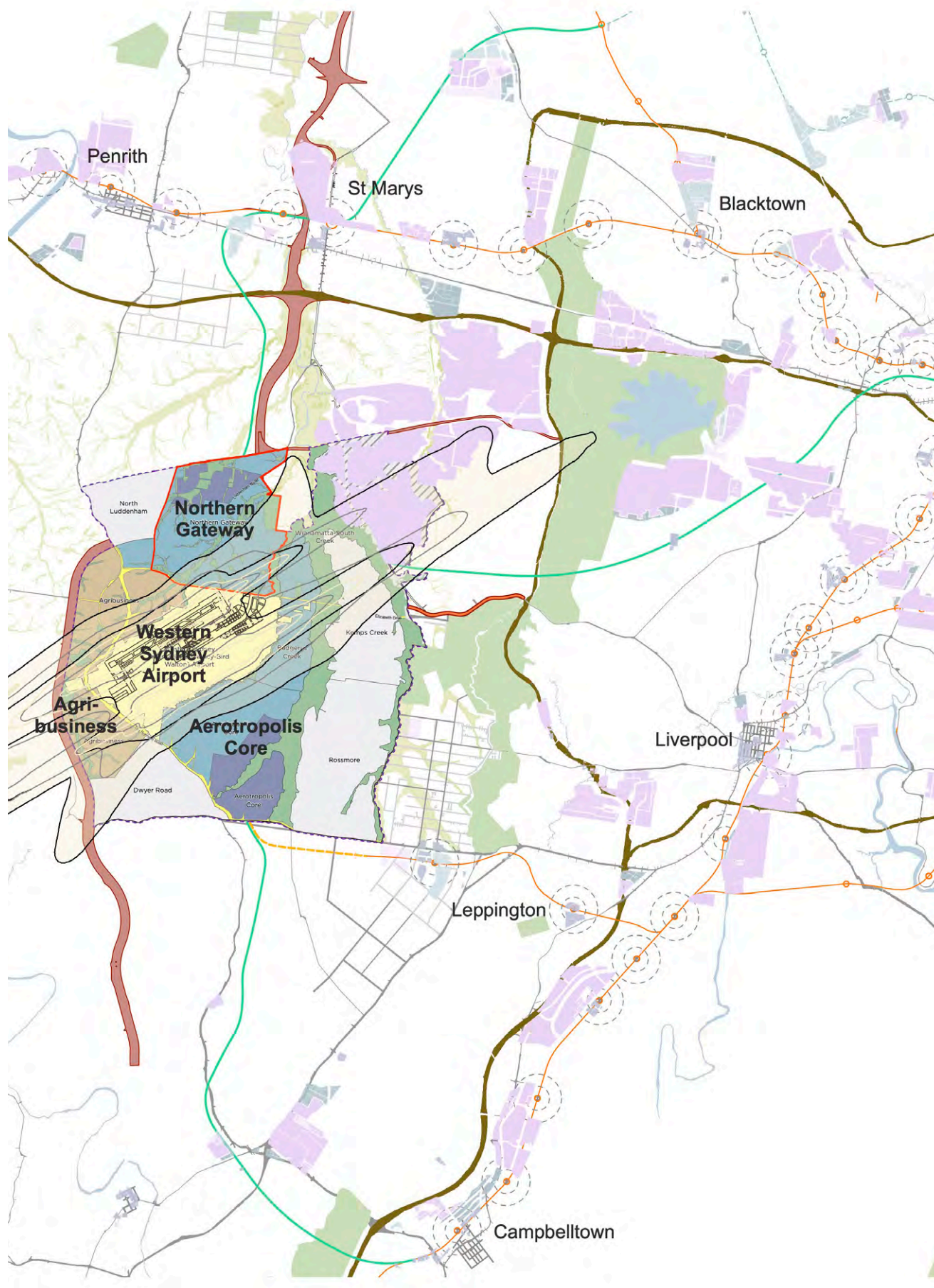




LAND USE AND URBAN FORM



Land use across the Northern Gateway Precinct will capitalise on the opportunities provided by the airport and proposed connections to wider Sydney. An integrated parkland city will emerge, with a focus on employment and mixed use activity.



Land use map within Aerotropolis and Greater Western Sydney

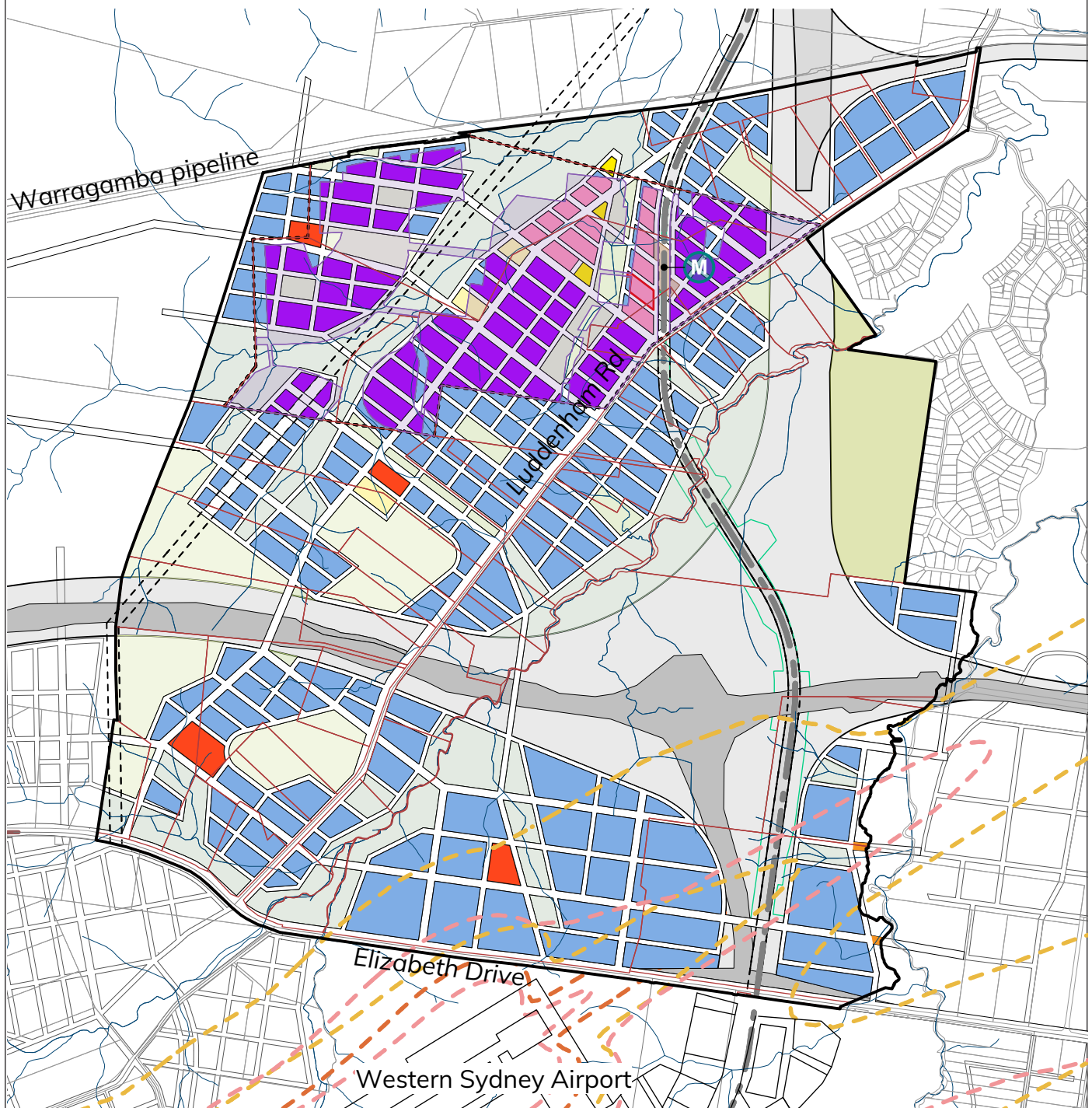
PRECINCT LAND USES

The land use zoning is set by the specific State Environmental Planning Policy (SEPP) and relates to the urban structure and transport hierarchy. The highest densities and greatest mix of uses will be concentrated in the Strategic Centre around the metro station. This area will also be very well served by buses and connected with the extensive cycleway network, allowing a lively urban place to rapidly develop as a major new centre for western Sydney.

Around the Strategic Centre a mix of uses are enabled by the zoning. These areas are supported by a generous and connected street system, forming tight urban blocks. Away from the Strategic Centre, the blocks become larger and the prescribed uses encourage major warehousing, distribution and manufacturing activities. These will inevitably be supported by a range of secondary and service uses.

A number of smaller local centres distributed across the precinct will provide diversity and some convenience retail uses. These centres will be non-residential but will have the potential to become a focus for the community as it develops over time. Their location is in relation to street hierarchy, bus connections and interface with parklands. These local centres are also distributed to provide local choices for those who want to walk and cycle, in so doing reducing reliance on car use for some trips.

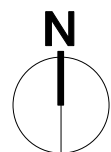
Given the precinct's location to the airport, there are constraints associated with noise and building height limitations associated with the OLS. Parts of this precinct are in ANEF contours 20 or greater which will limit the types of land use within the southern portion of the site.



- Metro station. Vertical alignment to be confirmed at master planning stage
- Sydney Science Park Boundary
- Cadastre
- Precinct Boundary
- ANEC 35 Contour
- ANEC 30 Contour
- ANEC 25 Contour
- ANEC 20 Contour
- Proposed street network
- Specialised Centre (mixed use). Strategic innovation and focused on an employment generator or theme - and contains a metro station
- Centre (non-residential)
- Education

- Special (public and community)
- Enterprise
- Proposed Mixed Use, subject to future master planning
- Mixed Use to existing approval, subject to future master planning
- Proposed Riparian Park
- Proposed Ridgetop Park
- Proposed Urban Park
- Proposed Nature Park
- Proposed Metro alignment
- OSO/Freight rail corridor
- M12 corridor

0 500 1000 M



BUILT FORM

KEY BUILT FORM PRINCIPLES

1. Height is greatest within the Strategic Centre Mixed Use area, where the open spaces and Sydney Metro Station offer amenity and connectivity benefits.
2. Buildings are designed to address streets and open space.
3. Buildings are designed consistent with passive cooling principles, maximising the potential for cross ventilation and minimising solar heat gain.
4. Building type and scale responds to its intended use and topography.
5. Buildings and associated construction methodologies are designed to maintain adequate clearance for air navigational activity over and around the Aerotropolis.
6. Within identified centres, buildings present to adjacent roads and open space to create people focused and place based outcomes.

Within the Specialise Centre:

- Provide positive address and architectural presence to street frontages.
- Provide along public space frontages, point towers with excellent amenity.
- Allow the maximum gross

footprint for any footprint above 27m, is 600m².

- Allow towers to come directly to ground, without podium setbacks, where wind and microclimate impacts are mediated.
- Allocate major corner sites that front open space and major streets for buildings of a civic nature such as district libraries, community centres, indoor sports facilities, clubs and the like.
- Design all buildings to be of high architectural quality.

Within the Mixed Use Zone:

- Provide street wall building types to street frontages with appropriate scale and articulation
- Permit zero setback on major streets
- Provide point towers with excellent amenity at dominant corners and frontages.
- Allow opportunities away from the major streets, for increased setbacks for residential towers so as to have generous ground floor or podium landscaped courtyards.
- Design buildings of high quality that meet the requirements of the Apartment Design Guide (ADG) where applicable.

Within the Enterprise Zone:

- Notwithstanding the larger format of building footprints, buildings should address streets through clarity of entries, articulation

and siting of active uses to street frontages, with levels consistent with the primary street address

- Level differences between buildings and any adjacent parkland / street should be minimised. Siting the smaller footprint associated ancillary uses of developments along these edges will minimise instance of level differences.
- Industrial and enterprise architecture will be of high quality and should promote sustainable design by integrating design elements such as solar collectors and battery storage, roof gardens, water reuse and the like
- All buildings and car parks should be carefully integrated with the landscape design.
- Minimise driveway crossings to streets, sharing driveways where possible

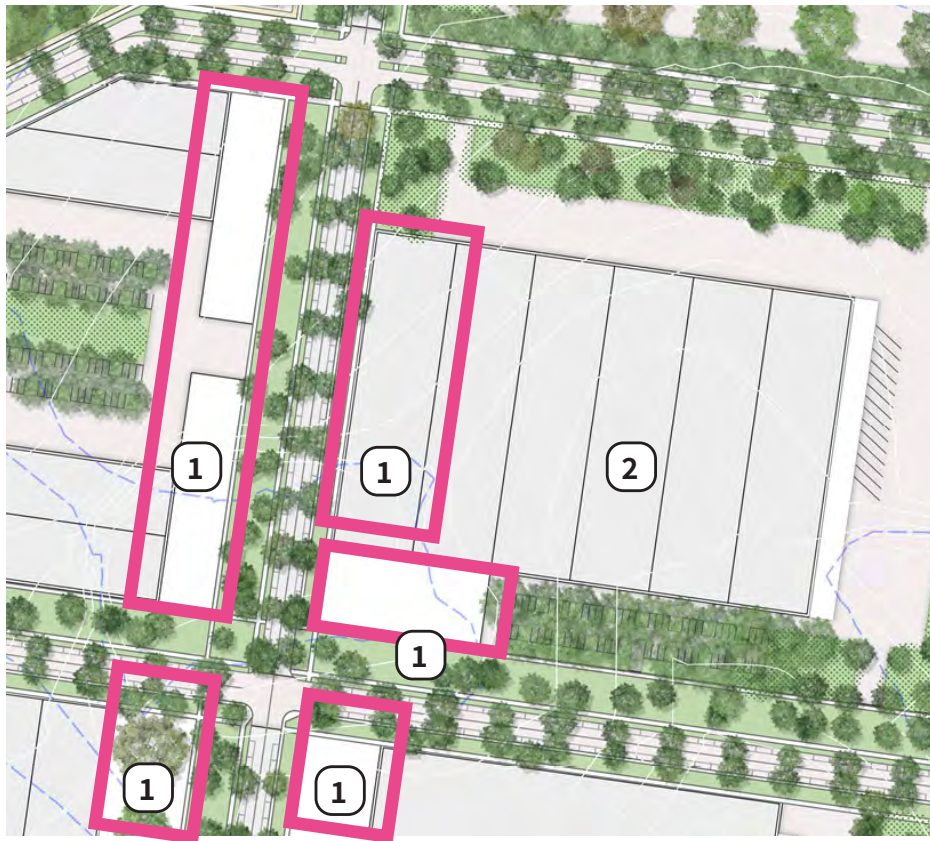


Street wall and point tower built forms address the main open spaces within the specialised centre



Prominent corner sites with civic buildings that address the public

Industrial built form



Larger scale industrial block north of Elizabeth Dr

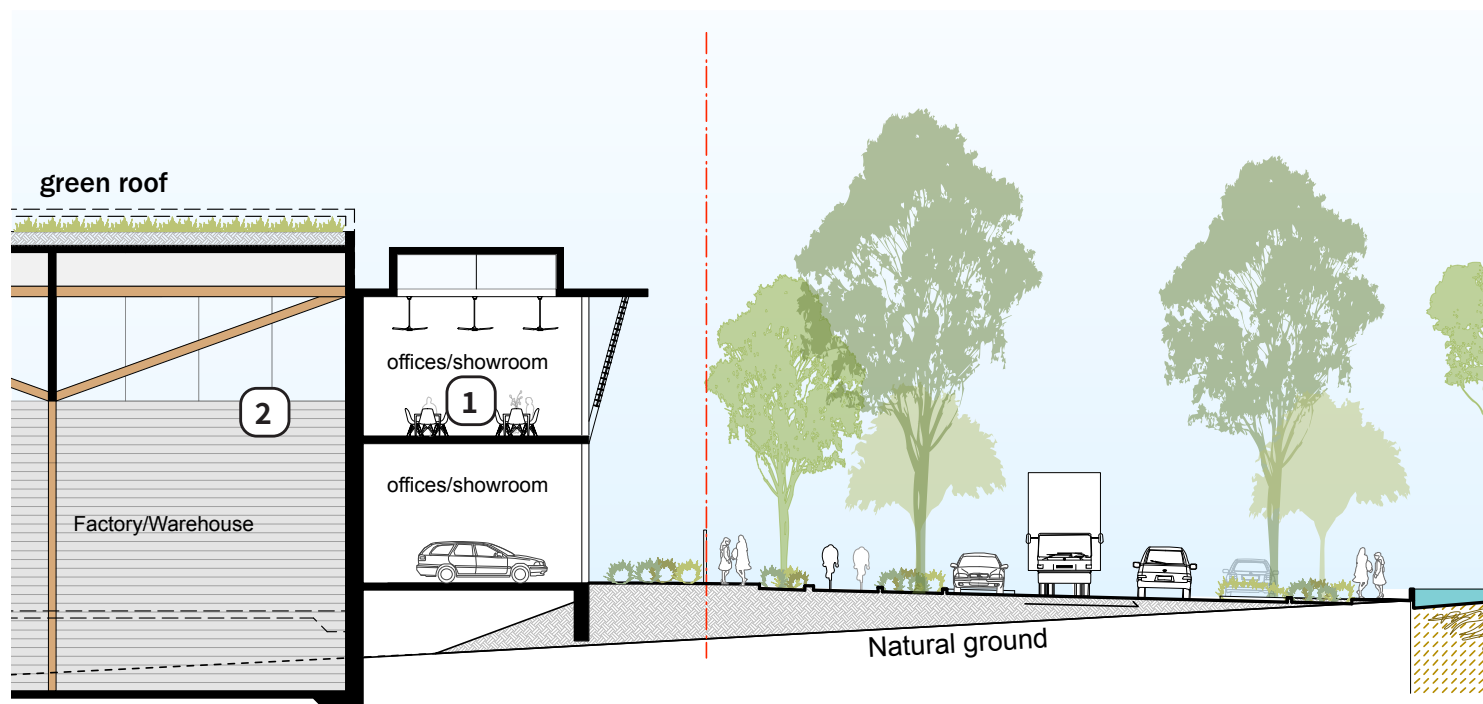
□ Activate frontages of industrial building by situating ancillary uses such as office or showrooms and the like along major street or park frontages and corners of intersections

1 Activate frontages of industrial building by placing ancillary uses such as office or showrooms and the like. Larger operations can be placed behind.

2 Larger scale component of industrial building located behind street front component, can be more flexible in section to minimise cut and fill

The Roofscape as Resource

- The roofscapes within the Northern Gateway precinct should be utilised to harvest rainwater, produce solar power or green roofs.
- Water harvested can be re-used within the Northern Gateway in a closed or open system depending on scale.
- Energy produced can be used on site or linked to the broader energy network to support the Aerotropolis and Greater Sydney.





HKA Architekten



Hadi Tehrani

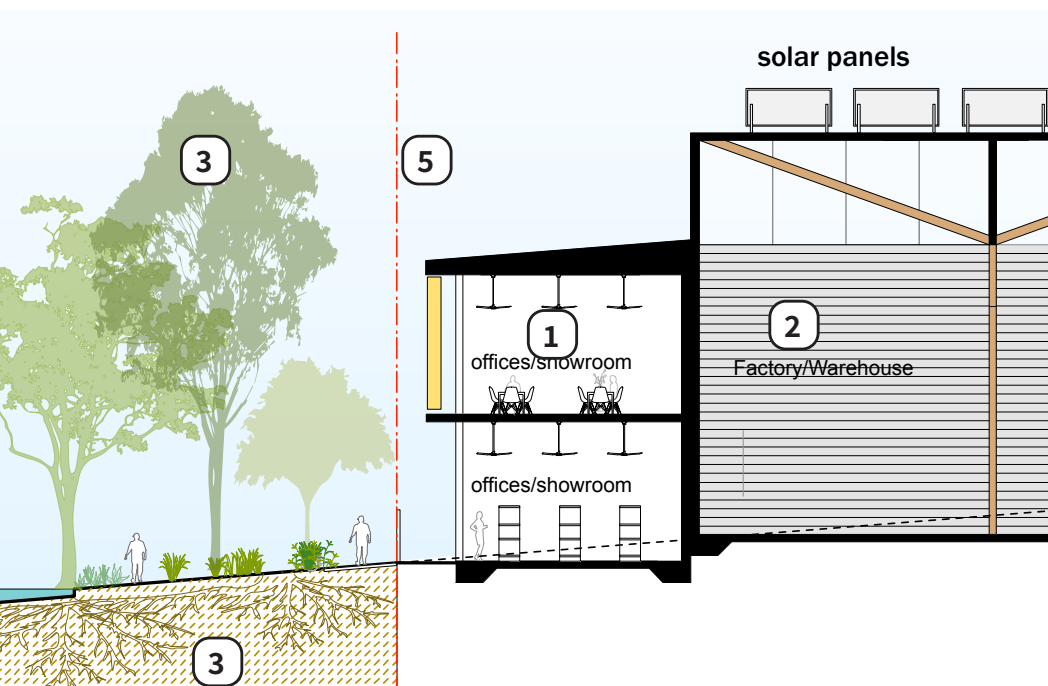


DLW- Architectes

Examples of high quality industrial and commercial buildings



Approach Design



- 1** Activate frontages of industrial building by placing ancillary uses such as office or showrooms and the like. Larger operations can be placed behind.
- 2** Larger scale component of industrial building located behind street front component, can be more flexible in section to minimise cut and fill
- 3** Earth zone with protected natural soil profiles. Earth zones create larger volumes of soil for larger trees. Refer to the Principle and the Undisturbed Soil Network chapter in this report.
- 4** Larger trees for shading buildings. Mitigates urban heat effect.
- 5** West and North façades can have zero setback in order to maximise tree canopy in public space such as road reserves or street parks.

YIELD - MIXED USE ZONE

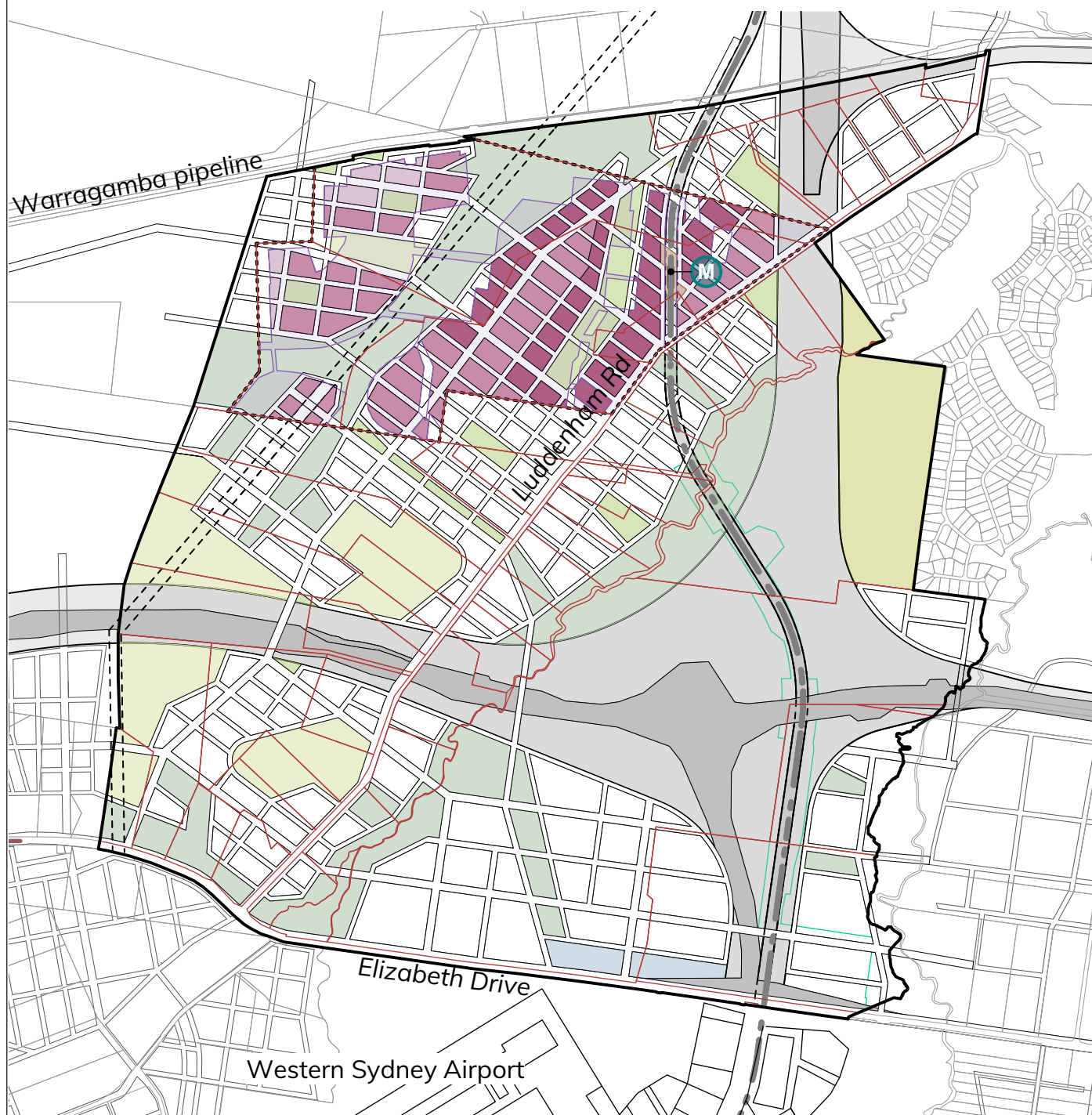
The Mixed Use Zone will become a vibrant strategic centre, as it concentrated around the new metro station. The extensive parklands provide the perfect opportunity to embrace the principle of higher densities with the highest amenity, as the most intense forms of development are concentrated along the new parkland corridors that are an integral part of the Blue-Green Grid. These green corridors will become emblematic of the emerging western Parkland City, as envisaged by the Greater Sydney Commission.

The Mixed Use areas are characterised by a higher connective street grid. In order to relieve the density, major east-west streets are all open ended, affording vistas to the landscaped creek corridors, and westward to the mountains beyond. It is important that these streets are heavily planted to provide pedestrians and cyclists with adequate shade to mitigate against urban heat island effects.

The Mixed Use Zone will in time be well served by a range of bus

services, while the Green Grid and shaded street network offer significant opportunities for cycle connections and recreational opportunities.

The major streets in the Mixed Use Zone will develop a mix of uses with active frontages. Employment and residential uses will be supplemented by public, community and specialist centres.



Metro station. Vertical alignment to be confirmed at master planning stage

--- Sydney Science Park Boundary

— Cadastre

— Precinct Boundary

□ Proposed street network

□ 1:1 FRS

□ 1.8:1 FSR

□ 3:1 FSR

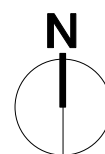
□ Mixed Use to existing approval, subject to future master planning

— Proposed Metro alignment

□ OSO/Freight rail corridor

□ M12 corridor

0 500 1000 M



HEIGHT FRAMEWORK

In the Northern gateway Precinct, the highest buildings are concentrated in and around areas of high amenity in the Specialised Centre and mixed use areas. These areas will have ready access to the metro station, local and regional bus services and the generous parklands that thread through this major new centre for Western Sydney.

Within the specialised centre, the dominant building height will be 27 metres, which is predominantly in the form of a perimeter block street wall type. The street wall, made up of generally contiguous building frontages, will define the space of the streets and encourage footpath level activation in the core. These perimeter block building forms can readily accommodate large footprint office and commercial uses, or be adapted to mixed use and residential accommodation.

The street wall type will be punctuated by 45 metre high point towers along major public frontages which enjoy excellent amenity. The maximum gross footprint for any building above 27metres in height is 600m² (inclusive of all balconies, perimeter walls, plant and enclosed floor area). The small footprint

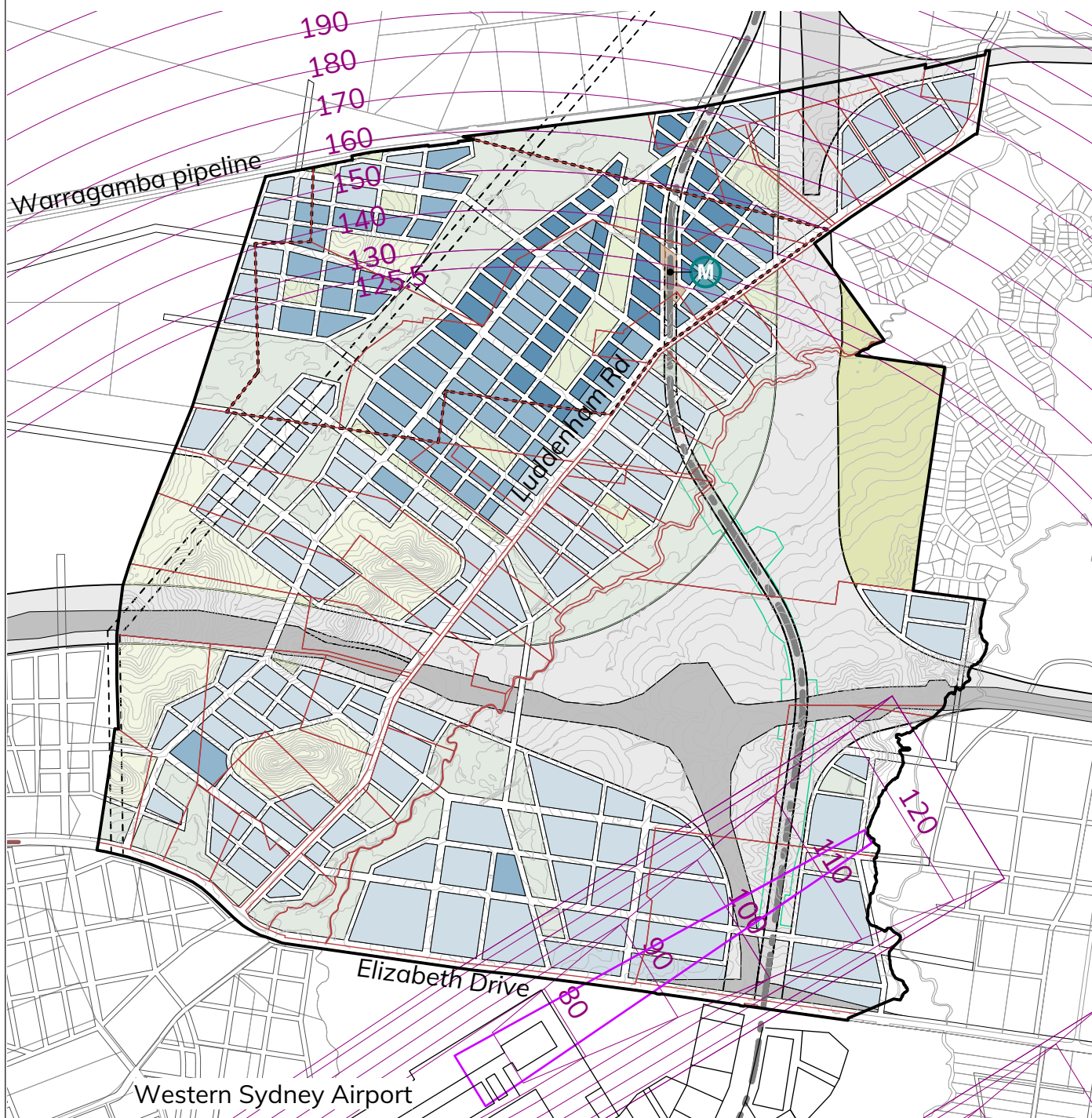
towers will create slender profiles on the skyline, casting smaller, fast moving shadows across the public domain. The compact footprint tower forms will also have excellent internal amenity, maximising sun, daylight and natural ventilation, outlook and amenity to allow superior performance in relation to SEPP 65 and the Apartment Design Guide. The configurations of these footprints are indicated on the public domain plan on page 43 of this report.

Within the mixed-use area, buildings generally have a maximum height of 27 metres, reducing to 20 metres away from park frontages and further from the core.

Flexible employment enterprise areas are predominately 16 metres in height, with a maximum 20 metres to allow for roof projections, roof pitch, structure, accessible green roof, access to solar panels, other plant and the like.

OLS Constraints

The height map includes an overlay of the OLS contours. In some instances the OLS contours will sit below the indicated heights and supersede them. Intrusions would require referral and approval.



Metro station. Vertical alignment to be confirmed at master planning stage

OLS Chart Line

Public Safety Area cone

Sydney Science Park Boundary

Cadastre

Precinct Boundary

Proposed street network

20m

27m

45m

Proposed Metro alignment

OSO/Freight rail corridor

M12 corridor

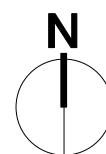
Proposed Riparian Park

Proposed Ridgetop Park

Proposed Urban Park

Proposed Nature Park

0 500 1000 M



SOCIAL INFRASTRUCTURE FRAMEWORK

PRINCIPLES

1. Co-location with open space

- School - sport & recreation facility - open space where topography permits.
- Libraries, social & cultural institutions - park frontage

2. Co-location of complementing institutions & services

- Libraries, social and cultural institutions
- Local centres & active recreation in enterprise zone
- Open space + active recreation in enterprise zone

3. Location and distribution throughout the precincts to ensure good accessibility to both workers and residents

- Good public and active transport accessibility
- Proximity to interconnected open space facilitates and encourages active transport

1. Sport and recreational facilities

Due to the steep topography and importance of retaining the natural hill tops, outdoor playing fields are difficult to be co-located with educational facilities. Education facilities and the playing field will have good accessibility to public transport e.g. Metro and transport routes.

Multi-purpose sport courts are distributed throughout the precinct to ensure workers and residents have access to active recreation within their local area. Some are co-located with educational facilities and in enterprise zones, these are located in open spaces.

Indoor sport venues are located in specialised or local centres, oriented towards open space and with good accessibility to public transport - Metro and local transport route.

All sport & recreation facilities have good accessibility by public and active transport.

2. Educational facilities

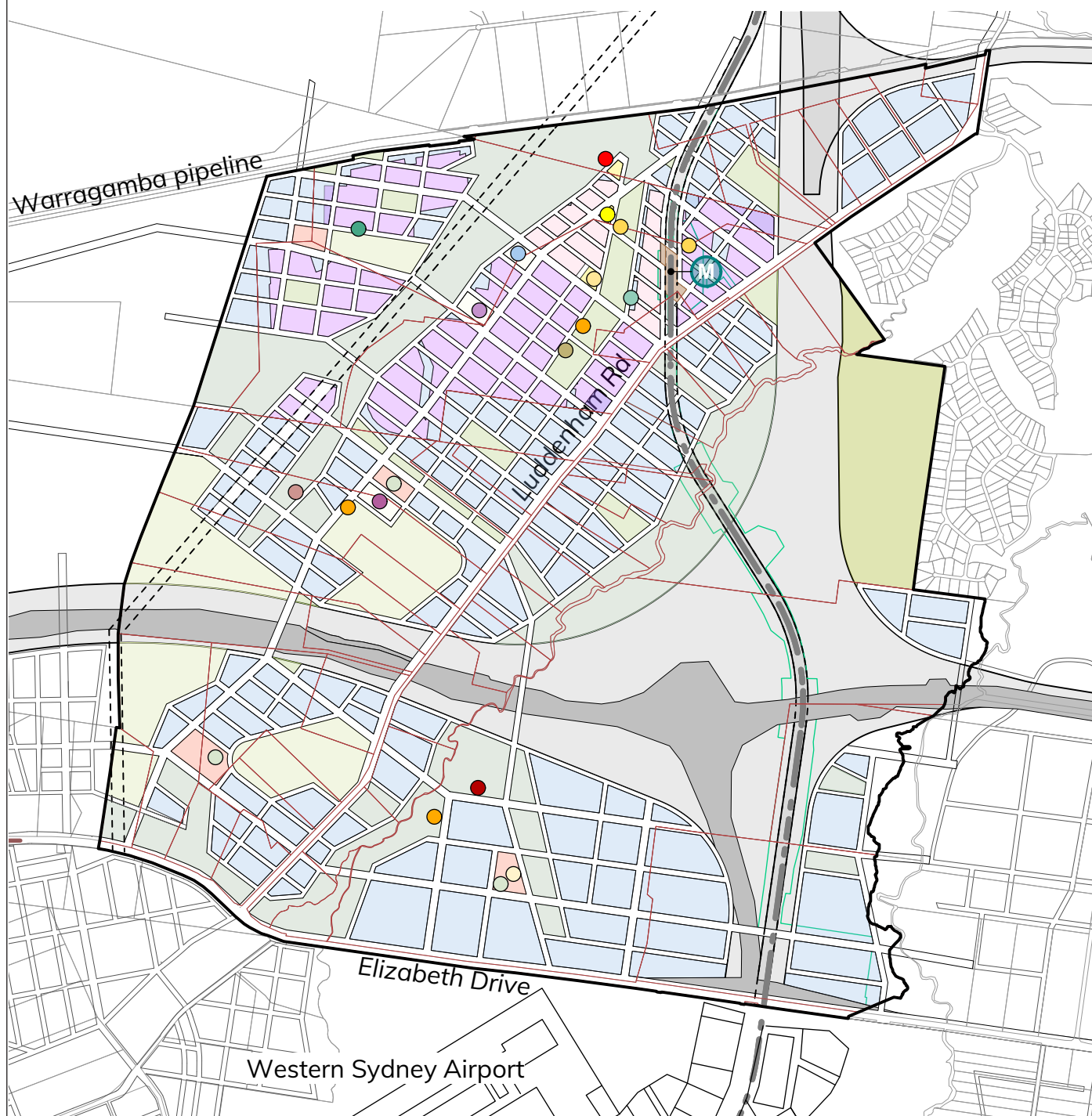
Educational facilities are oriented towards open space. Hilltop and riparian parks and have good access to public transport e.g. Metro station or local bus transport.






























3. Social and cultural infrastructure

Libraries, community centres and cultural institutions are the core of the community life - for residents, workers and visitors alike. Prominent situations with park frontage within the Specialised Centre or co-located with community facilities and with great public and active transport accessibility.

4. Civic Spaces

Civic spaces should be considered in the Specialised Centre especially around the metro station. These should be co-located with a range of community facilities.



-  Metro station. Vertical alignment to be confirmed at master planning stage
-  Precinct Boundary
-  Cadastre
-  Private owned childcare facility
-  Aged Care facility
-  Council owned childcare facility
-  Youth focussed outdoor recreation
-  Outdoor Sports Field
-  Outdoor Sports Courts
-  District Indoor Sporting Facility
-  Local Cultural Facility
-  Local Cultural Facility
-  Secondary School
-  Primary school
-  Other Education
-  District Library
-  District/Local Community
-  Proposed street network
-  Proposed Metro alignment
-  Specialised Centre (mixed use)
-  Centre (non residential)
-  Education
-  Special (public and community)
-  Enterprise
-  Proposed Mixed Use, subject to future master planning
-  Proposed Riparian Park
-  Proposed Ridgetop Park
-  Proposed Urban Park
-  Proposed Nature Park

0 500 1000 M



Note: Cultural and community infrastructure - notional location only. To be determined in consultation with local community.

