

WEST

DISTRICT

SYDNEY GREEN GRID
SPATIAL FRAMEWORK AND PROJECT OPPORTUNITIES

PREFACE

Open space is one of Sydney's greatest assets. Our national parks, harbour, beaches, coastal walks, waterfront promenades, rivers, playgrounds and reserves are integral to the character and life of the city.

In this report the hydrological, recreational and ecological fragments of the city are mapped and then pulled together into a proposition for a cohesive green infrastructure network for greater Sydney.

This report builds on investigations undertaken by the Office of the Government Architect for the Department of Planning and Environment in the development of District Plans. It interrogates the vision and objectives of the Sydney Green Grid and uses a combination of GIS data mapping and consultation to develop an overview of the green infrastructure needs and character of each district.

Each district is analysed for its spatial qualities, open space, waterways, its context and key natural features. This data informs a series of strategic opportunities for building the Sydney Green Grid within each district. Green Grid project opportunities have been identified and preliminary prioritisation has been informed by a comprehensive consultation process with stakeholders, including landowners and state and local government agencies.

This report is one step in an ongoing process. It provides preliminary prioritisation of Green Grid opportunities in terms of their strategic potential as catalysts for the establishment of a new interconnected high performance green infrastructure network which will support healthy urban growth. Future reports should be undertaken to assess the future delivery and implementation strategies of Green Grid projects.

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PREPARED FOR

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IN ASSOCIATION WITH

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WEST

SPATIAL FRAMEWORK



1 MAJOR RIVER CATCHMENT

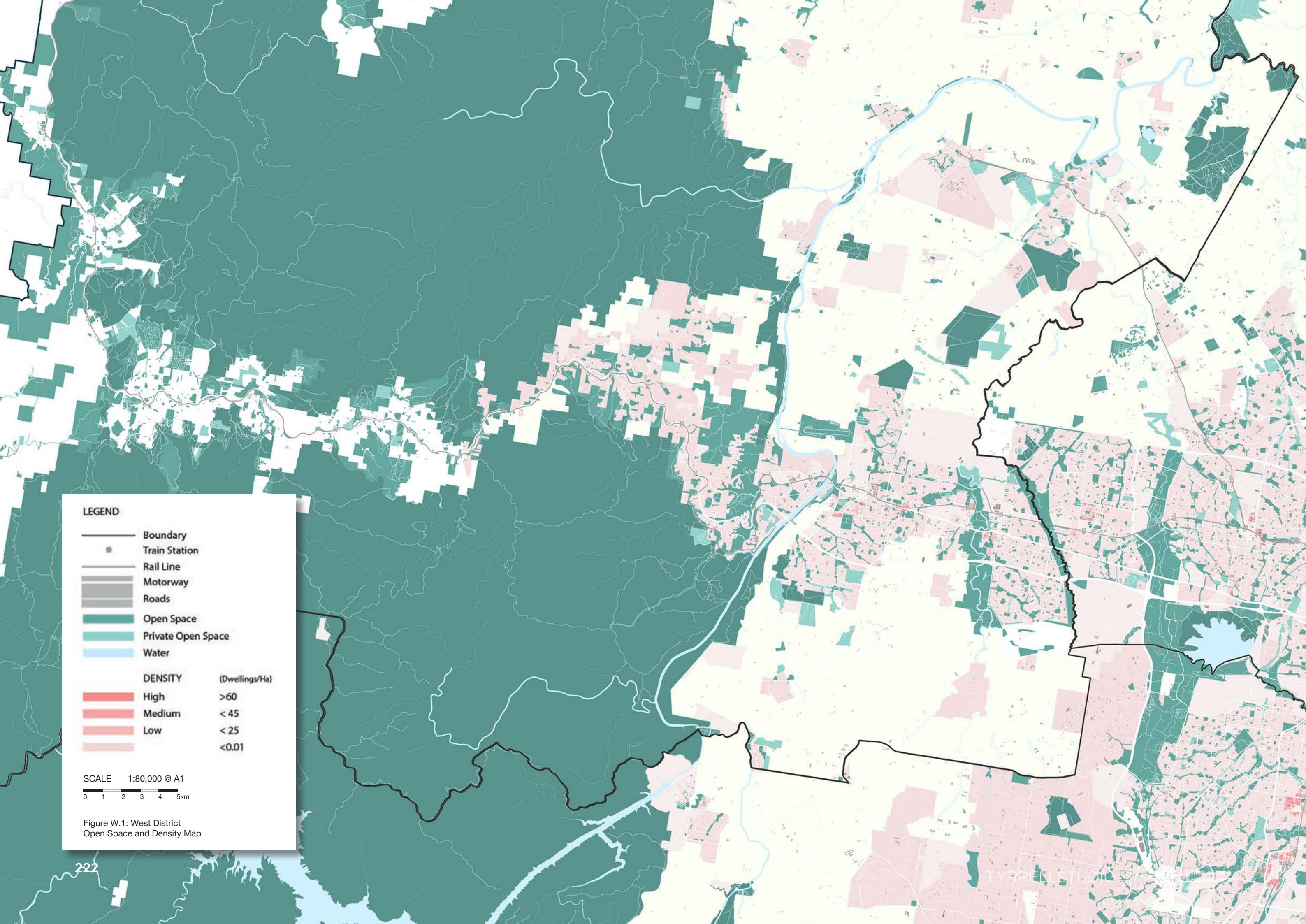
91,500

ADDITIONAL PEOPLE BY 2036

327,455

HECTARES OPEN SPACE

71% OF THE DISTRICT IS OPEN SPACE



LEGEND

- Boundary
- Train Station
- Rail Line
- Motorway
- Roads
- Open Space
- Private Open Space
- Water

DENSITY (Dwellings/Ha)	
	High >60
	Medium < 45
	Low < 25
	<0.01

SCALE 1:80,000 @ A1

0 1 2 3 4 5km

Figure W.1: West District Open Space and Density Map

WEST DISTRICT

1.1 LANDSCAPE CHARACTER

THE HISTORY OF DEVELOPMENT AND THE CHARACTER OF SYDNEY HAS BEEN INFLUENCED BY TOPOGRAPHY AND THE UNDERLYING NATURAL FEATURES. THE SYDNEY GREEN GRID BUILDS UPON THE GEOMORPHOLOGY OF PLACE TO CREATE LOCALLY RESPONSIVE OPEN SPACE STRATEGIES. THESE LANDSCAPE FEATURES HAVE BEEN USED TO ESTABLISH A FRAMEWORK FOR FUTURE PROJECT AND DEVELOPMENT OPPORTUNITIES.



Blue Mountains



Nepean Hawkesbury River



Mt Tomah

The West District is characterised by the Greater Blue Mountains Area and an extensive range of seven National Parks providing a visual backdrop for the Western suburbs of the Sydney Metropolitan area.

The Blue Mountains National Park constitutes one of the largest and most intact tracts of protected bushland in Australia and is internationally significant having achieved UNESCO World Heritage status. Its exceptional biodiversity values are complemented by indigenous and post-European-settlement cultural values, geodiversity, water production, wilderness, recreation and natural beauty.

The primary catchments for the district are the Hawkesbury-Nepean River Catchment and the South Creek Catchment with their floodplains and extensive network of tributaries that traverse the district.

The floodplain of the Hawkesbury-Nepean forms part of the broader Cumberland Plain with its characteristic low rolling hills and wide valleys. With some of the most fertile soils and a long history of food production, the floodplains are some of the most important agricultural and rural resource lands for Metropolitan Sydney.

While vast tracts of bushland remain, urban settlement, land releases and vegetation clearing has fragmented native vegetation communities and habitats.

Many of the original ecological communities that thrived on the plain are now considered endangered, for example The Cumberland Plain Woodland and Castlereagh Swamp Woodland. These communities will continue to come under pressure with urban development and housing growth within the district.

Due to the topography, history of land use and climate, the district is also subject to a number of environmental hazards, such as flooding, bushfire and salinity. The water quality of the Hawkesbury-Nepean River and its tributaries has been reduced by stormwater runoff from urban areas and nutrient and sediment runoff from agricultural areas.

A number of tributaries have been either channelised or piped so that there are limited natural open water bodies throughout the district.

Underlying the West district are some of the deepest sections of the Sydney Basin sedimentary strata and consequentially highly valuable natural resources. Sand, gravel and clay continue to be extracted to supply Sydney's construction industry from the Hawkesbury and Penrith LGAs, while the potential of the district's natural gas and coal resources is also currently under investigation.



1.2 STRATEGIC CONTEXT

The West District is in a strategic location as the gateway to regional NSW via the historic Great Western Highway. The Regional City, Penrith is the economic and commercial centre of the district. It has a strategic location between the North West and South West Growth Centres and in close proximity to the Western Sydney Employment Area.

This district forms the periphery of the Sydney metropolitan area. The district has a wealth of regional assets including the the World Heritage listed Blue Mountains National Park, the food producing floodplains of the Hawkesbury-Nepean River, military reserves and defence bases, cultural institutions such as the Western Sydney University and major sporting attractions such as Penrith International Regatta Centre and Whitewater Stadium.

The Hawkesbury-Nepean River and the Blue Mountains National Parks are significant social and economic assets within the district that will continue to play a critical role in ongoing development and investment. Public access to these key open spaces should continue to be enhanced at all opportunities.

Many initiatives are being planned to enhance the open space and public domain in and around Penrith and provide better connections to and across the Nepean River. Future large scale projects such as the Penrith Panthers site and Penrith Lakes Regional Park will provide a focus of regional assets for the district and beyond.

While the majority of land within the district is open space, areas east of the Hawkesbury-Nepean River are transitioning from traditional rural or village settings to higher population densities. This presents opportunities and challenges for creating a variety of open space and recreation facilities within reasonable distances from where people live. The changing nature of the area provides the impetus to adopt a co-ordinated approach to flood management, biodiversity conservation and the creation of habitat corridors, healthy transport network linking major community facilities with local town and transport centres. Strategic consideration in all future development needs to be given to the District's hazards associated with bushfires, flooding and heatwaves.

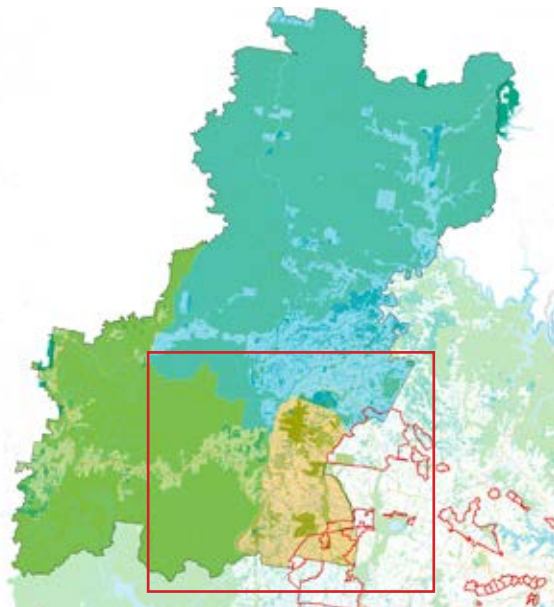
The recent announcement of Western Sydney Airport will have a significant influence on development opportunities, growth and infrastructure within the district.

Major projects such as the potential South West Rail Link extension to St Marys via Western Sydney Airport, potential Outer Sydney Orbital and Bells Line of Road corridor improvements should consider opportunities available to increase connections to existing open space or provide open space along with infrastructure delivery.

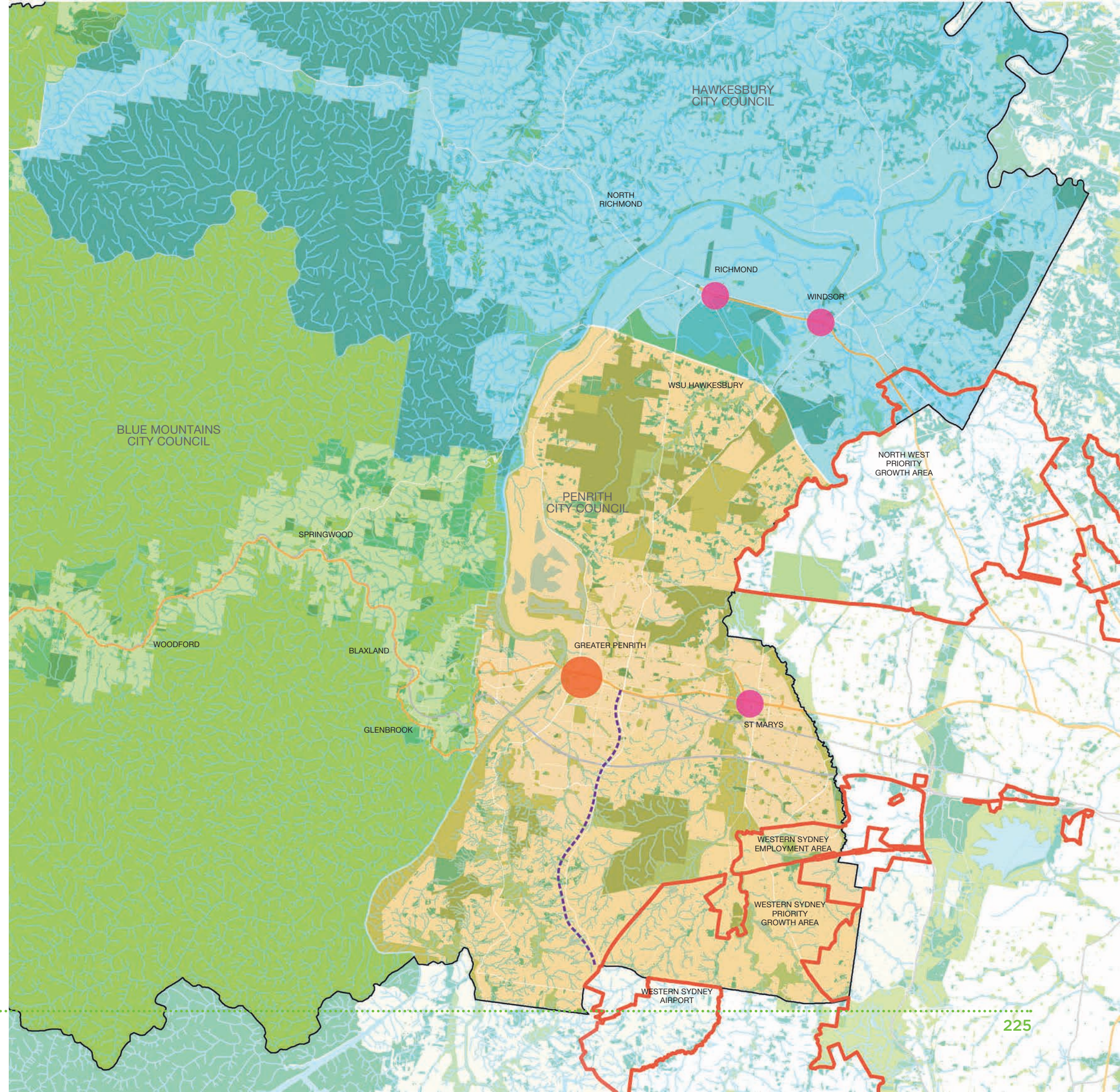
A number of initiatives are already in place that reflect the strategic objectives of the Sydney Green Grid. For example, the Our River Nepean River Master Plan, Penrith Lakes Master Plan, Riverlink Precinct Plan and Nepean Bridge uphold the principle of increasing public access to and along the river foreshore and providing a variety of open space, recreation opportunities and active living connections.

These initiatives along with infrastructure and development projects and providing improved access between centres, forms an important starting point for the implementation of the Green Grid strategy across Sydney.

With significant population growth projected across the Sydney Metropolitan region many suburbs will undergo dramatic change to the existing character or land-use within their region. The integration of open space with future transport and development projects will contribute to increased liveability for communities.



West District Location Plan



LEGEND

- Motorway
- Roads
- Train Station
- Rail Line
- Strategic Centre
- District Centre
- Key Regional Open Space
- District Open Space
- Local Open Space
- Private Open Space
- Road Upgrades

SCALE 1:80,000 @ A1
 0 1 2 3 4 5km

Figure W.2: West District LGA Plan

WEST DISTRICT

1.3 PROJECT OPPORTUNITY CLUSTERS

THE STRATEGIC FRAMEWORK PROVIDES AN OVERVIEW OF REGIONAL OPEN SPACE OPPORTUNITIES AS A SERIES OF PROJECT OPPORTUNITY CLUSTERS. IT IS ENVISAGED THAT THESE CLUSTERS FORM A STARTING POINT FOR ENSURING THE MORE GENERALISED DISTRICT STRATEGIES AND ANY FUTURE PROJECT DELIVERY RESPONDS TO THE LOCAL STRATEGIC CONTEXT AND LANDSCAPE CONDITIONS.

WD.1.1 PENRITH-ST MARYS

This outer suburban area is characterised by a dominant linear rail line, road infrastructure and the industrial land south of Penrith and north of St Marys. With proposals to undergo significant urban renewal around the station precinct and Panthers site, Penrith will form critical link between the South-West and North-West Growth Centres and Western Sydney Employment Area. Penrith's catchment however, extends far beyond to areas such as the Blue Mountains, Hawkesbury, Blacktown, Camden and Wollondilly LGAs and as far as Central Western NSW. With significant areas of open space occupying the floodplain there is great opportunity for rejuvenating open spaces, sports facilities and providing new connections that will support recreation needs and enhance liveability for a growing population in the surrounding area and beyond.

With Penrith's close proximity to the Nepean River there is key opportunity to enhance open space, pedestrian links, sports and water sports facilities along the Nepean River and as part of the Penrith Lakes Regional Park and employment lands. There is also opportunity to provide improved pedestrian and cycle connections from the areas of renewal around the stations at Penrith, Kingswood, Werrington and St Marys with the open space network, green corridors of South and Ropes Creek and the Penrith Education and Heath Specialised Precinct which includes Nepean Hospital and WSU Penrith Campus.

WD.1.2 NEPEAN RIVER, PENRITH

The Nepean River at Penrith is considered to be the stretch from the M4 bridge to the Penrith Lakes precinct on both the eastern and western banks. With a significant amount of water frontage within the Penrith LGA there are key opportunities to enhance the identity of the area through public domain improvements and improved access to, across and along the river. Connections from surrounding centres to the river can also be enhanced. Key sites that could contribute to the open space network are Penrith Panthers, Penrith Council's Carpenter and Woodriff Gardens, Peach Tree Creek corridor, Penrith Lakes precinct, Tench Reserve, Weir Reserve, Regatta Park and River Road Reserve.

WD.1.3 HAWKESBURY-NEPEAN RIVER

The River, its floodplain and tributaries are the most distinguishing features of the district. With a tradition of agriculture and rural residential dwellings, the major opportunities for open space projects are to create continuous foreshore access and increased access to the waterfront at key destinations. As increases in density occur within nearby centres, the importance of the river as a recreational destination will also increase.

Water quality management and revegetation along all waterways should be sought at every available opportunity.

WD.1.4 PENRITH LAKES

Covering an area similar to that of Sydney's outer harbour, there is significant opportunity for the previous quarry at Penrith Lakes to become Western Sydney's iconic water haven. An urban settlement within an extensive system of lakes and parklands will also become a major recreational asset for Western Sydney. The project provides an opportunity to show case best practice in environmental rehabilitation and water management. It provides opportunities for enhanced quality of life and healthy lifestyle choices for the people of Western Sydney and beyond. The established sports focus (Sydney International Regatta Centre and the Penrith Whitewater Stadium) will guide the development of the parklands, with the Lakes providing a unique open water body for the people of Western Sydney.

WD.1.5 SOUTH CREEK AND ROPES CREEK

Western Sydney is defined by its network of creeks and rivers systems. Currently many of the creeks suffer from poor water quality due to surrounding land uses and reduced or fragmented vegetation cover. As land use patterns change and development increases, Ropes and South Creek corridors have the potential to be 'green corridors' providing a greater contribution to the development of healthy urban environments, active lifestyles and connectivity. With a balanced approach to access, biodiversity, development and recreation these networks can form valuable green infrastructure supporting future growth in the district.

WD.1.6 LOWER BLUE MOUNTAINS - GLENBROOK TO BULLABURRA

The foothills of the Blue Mountains where the M4 meets the Great Western Highway to Bullaburra, is characterised by a number of small towns along the route of the Great Western Highway and Main Western Railway Line. Bounded to the north and south by the Blue Mountains National Park and Greater Blue Mountains World Heritage Area, there is opportunity to enhance civic spaces for visitors and local communities, provide safe connections across the Great Western Highway and the rail line to key nature trails.

WD.1.7 MID BLUE MOUNTAINS - WENTWORTH FALLS TO KATOOMBA

This stretch along the Great Western Highway and Main Western Railway Line is characterised by popular tourist towns such as Leura and Katoomba with renowned natural features including Wentworth Falls and the Three Sisters at Echo Point, Katoomba. As the Blue Mountains continues to be an important nature-based recreational destination attracting local and overseas visitors, it is vital that the ecological biodiversity continues to be protected and that local communities are provided with enhanced public spaces and safe connections across the Great Western Highway and the rail line to key nature trails.

WD.1.8 UPPER BLUE MOUNTAINS - MEDLOW BATH TO WLL

At the highest points of the Blue Mountains are the towns of Medlow Bath, Blackheath and Bell lying within a semi-rural setting. As quieter visitor destinations with a number of key natural features such as the Grose Valley, Perrys Lookdown, Blue Gum Forest, with lookout points, waterfalls and bush walks, opportunity exists to improve the visitor experience and enhance nature based recreation. Opportunities exist to enhance public spaces for both visitors and local communities and provide safe connections across the Great Western Highway and the rail line to key nature trails.

WD.1.9 NORTH RICHMOND- RICHMOND-WINDSOR

This area is characterised by a dominant linear rail line between Windsor and Richmond, Richmond Air Force Base, the paddocks of WSU Hawkesbury Campus, expansive surrounding agricultural lands and floodplains of the Hawkesbury River and the rural-residential areas of Windsor, South Windsor, Richmond and North Richmond. With a significant amount of water frontage within the Hawkesbury LGA there are key opportunities at North Richmond, Richmond and Windsor to enhance the identity of the area through public domain improvements, improved access to, across and along the river and to enhance connections from the surrounding towns to the river.

WD.1.10 HAWKESBURY VALLEY PLAINS

The fertile floodplain of the Hawkesbury-Nepean and Rickabys Creek has a rural and rural-residential character with a long agricultural history and includes the suburbs of Castlereagh and Londonderry. The area will continue to provide agricultural and resource lands.

There are a series of key regional open spaces along The Northern Road including Wianamatta Nature Reserve, Castlereagh Nature Reserve and Windsor Downs Nature Reserve. There is potential to utilise these reserves as regional destinations, enhance amenities and create improved connections to Windsor and Penrith Lakes Regional Park. Other significant open spaces include Agnes Banks Nature Reserve and the Rickabys Creek corridor.

WD.1.11 BLUE MOUNTAINS FOOTHILLS

The lower slopes of the Blue Mountains are an important food producing area with a long agricultural history including the orchards of Kurrajong. The area borders the Blue Mountains National Park and has semi-rural and rural-residential character and includes the villages of Grose Vale, Kurrajong, Tennyson and Wilberforce. The area is a popular visitor destination for its natural surrounds and quiet village atmosphere. There is opportunity to promote sustainable agriculture and provide support and incentives for smaller farms and market gardens.



West District Location Plan

WD.1.12 GLENMORE PARK

This area is characterised by the existing residential at Glenmore Park and Glenmore Ridge. There is opportunity to improve water quality and vegetation cover of the extensive creek network and utilise these corridors to provide healthy urban environments, active lifestyles and connectivity to support future growth in the area.

WD.1.13 BELLS LINE OF ROAD

Bells Line of Road is considered the scenic route of the Blue Mountains and as an alternative to the Great Western Highway. Key destinations along this tourist drive include the fruit growing areas of Bilpin, Mount Tomah Botanic Gardens, Mount Wilson and Mount Irvine villages. There is opportunity to continue to promote and protect the agricultural heritage and character of the route, while any potential future motorway corridor should investigate benefits for cycle connections.



SCALE 1:80,000 @ A1



Figure W.3: West District Project Clusters Plan



1.4 INCREASE ACCESS TO OPEN SPACE

CONNECT PEOPLE WITH KEY REGIONAL OPEN SPACE AND PROMOTE THE DISTRICTS OPEN SPACE ASSETS BY CREATING BETTER CONNECTIONS WITH MAJOR CENTRES, NEW TRANSPORT INFRASTRUCTURE AND AREAS OF URBAN RENEWAL.

There are significant health and well being benefits associated with readily accessible, high quality open space. Well designed parks, plazas and streetscapes create highly liveable environments. With future growth in the West District estimated at 133,620 additional people in areas such as Penrith, Kingswood and St Marys, high quality open space and an interconnected network will provide the opportunity to promote greater liveability.

The West District has a wealth of natural resources and key regional open spaces that provide significant recreational opportunities and form the basis for a regional network of open space. The Blue Mountains National Park, Penrith Lakes, the Hawkesbury-Nepean River and its tributaries provide a coherent spatial strategy that defines the landscape quality of the District. Opportunities to improve access to these key assets from new growth areas will provide benefits for the existing and future population. Improvements to access should also be accompanied by improvements to the quality of the open space and the facilities available. This will ensure a better user experience and potentially increase the capacity of existing open space.

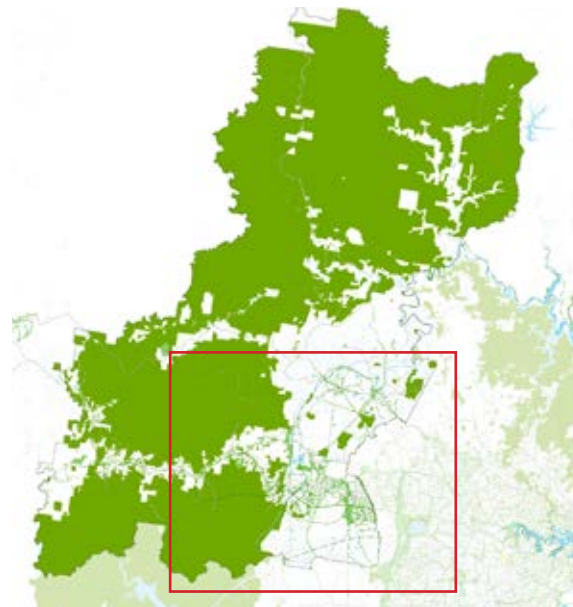
A series of key strategic opportunities have been identified and include:

- Undertake local open space studies to increase access to open space at a local level and ensure equity of access across the district.



Wentworth Falls

Nepean River, Penrith



West District Location Plan

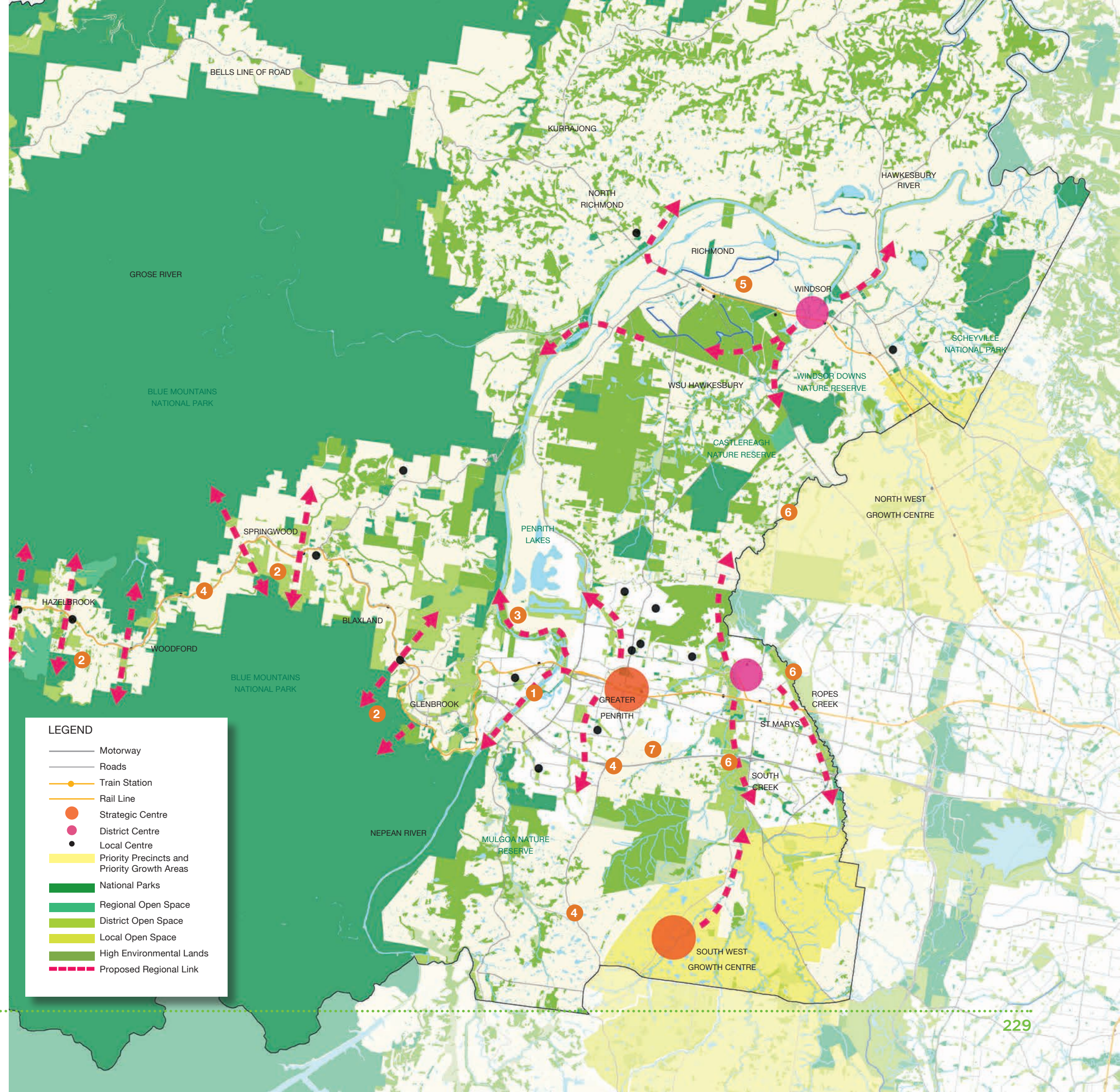
A series of key project opportunities have been identified and include:

1. Enhance the Nepean River foreshore as a parkland edge to Penrith. Provide continuous foreshore access and create a series of destination parklands along the corridor between Penrith and Penrith Lakes. Enhance access from Penrith town centre and station precinct to the Nepean River Foreshore and open space network.
2. Connect railway stations at Blue Mountains key centres with open spaces, surrounding Blue Mountains National Parks and key visitor destinations.
3. Enhance access to key open spaces along the Nepean River foreshore including Tench Reserve, Regatta Park, Weir Reserve.
4. Improve pedestrian and cycle connections across the M4, Great Western Highway and The Northern Road to facilitate access to major regional parks and creek corridors.
5. Enhance access from Richmond and North Richmond to the Hawkesbury River and reinforce the parkland edge.
6. Establish South Creek and Ropes Creek as major open space destinations to support development in the Werrington-Kingswood and St Marys precincts.
7. Create new open space supporting potential residential development at Orchard Hills.

SCALE 1:80,000 @ A1



Figure W.4: West District Access to Open Space Plan



LEGEND

- Motorway
- Roads
- Train Station
- Rail Line
- Strategic Centre
- District Centre
- Local Centre
- Priority Precincts and Priority Growth Areas
- National Parks
- Regional Open Space
- District Open Space
- Local Open Space
- High Environmental Lands
- Proposed Regional Link

CREATE A LIVEABLE GREEN NETWORK OF HIGH QUALITY ACTIVE TRANSPORT LINKS CONNECTING KEY DESTINATIONS, CULTURAL FACILITIES, RECREATION OPPORTUNITIES AND HERITAGE ITEMS.

1.5 PROMOTE HEALTHY AND ACTIVE LIVING



Colo River



Wollemi National Park



Blue Mountains

Walking and cycling are becoming increasingly important recreation and transport choices. Increased opportunities for physical activity contribute significantly to greater health within the community, reducing health costs and increasing quality of life. Walking and cycling have some of the highest participation levels out of all recreation types. Opportunities for increasing Sydney's network of active transport links should provide links between the places people live and work and the places that people want to visit.

The West district has many visitor attractions, cultural facilities and places of interest associated with open space. Key areas of urban renewal will afford the opportunity to improve cycleway and footpath networks linking key open spaces and the Hawkesbury-Nepean River. With a number of key links already in place, the district already has some good recreation resources to build on. However, these links connecting regional open space are not evenly distributed across the district.

1.6 CREATE NEW HIGH QUALITY PUBLIC REALM

ESTABLISH A VIBRANT, PEDESTRIAN FRIENDLY PUBLIC REALM AT KEY CENTRES, TRANSPORT INTERCHANGES AND URBAN RENEWAL AREAS, WITH PLACES FOR GATHERING AND GOOD CONNECTIONS TO OPEN SPACE.



Katoomba Civic Centre,



Penrith Station precinct proposal



Echo Point, Katoomba



Jacaranda Park, Glenmore Ridge

Build an open space network with high quality public realm at the centre. Squares, plazas and active streets offer important recreation and open space opportunities for social interaction. The public realm offer a starting point for the development of a well used and connected open space network. Key civic spaces or destinations should be integrated with public transport opportunities and existing development.

A series of key project opportunities have been identified and include:

1. Create high quality public domain and civic space at key locations associated with areas of urban renewal such as Penrith, Kingswood, Werrington and St Marys.
2. Create high quality civic spaces associated with areas of urban renewal along the Great Western Highway and rail corridor at Glenbrook, Blaxland, Springwood, Faulconbridge, Woodford, Hazelbrook, Lawson, Wentworth Falls, Leura, Katoomba and Blackheath.
3. Create new public space as a benefit of the potential South West Rail Link extension.
4. Create new public space as a benefit of large scale infrastructure projects including Great Western Highway upgrades (Woodford to Hazelbrook and Bullaburra) and potential future Bells Line of Road corridor improvement program.

WEST DISTRICT

THE HYDROLOGICAL GRID

Identify and minimise disturbance to riparian areas and protect and improve the natural character, ecological integrity, visual amenity and public access to foreshores and rivers.





Examples of major watercourses in the district include the Hawkesbury River, Nepean River, South Creek, Glenbrook Creek, Cedar Creek, Wentworth Creek, Grose River, Colo River and Macdonald River. The catchment of the Blue Mountains National Park is an important source of water for the district.

Blue Mountains Swamps occur within the West District and are listed as a threatened ecological community under the TSC and EPBC Acts. They comprise a unique floral assemblage and provide habitat for a number of threatened species including the Blue Mountains Water Skink and Giant Dragonfly. The swamps play a vital part in maintaining the water flows of creeks and waterfalls, including acting as a filter prior to releasing water into the creeks.

The district contains the Penrith Lakes site, where completed quarry stages are rehabilitated into lakes, wetlands and parklands.

Cranebrook Wetland has been identified as a regionally significant wetland within the Penrith LGA.

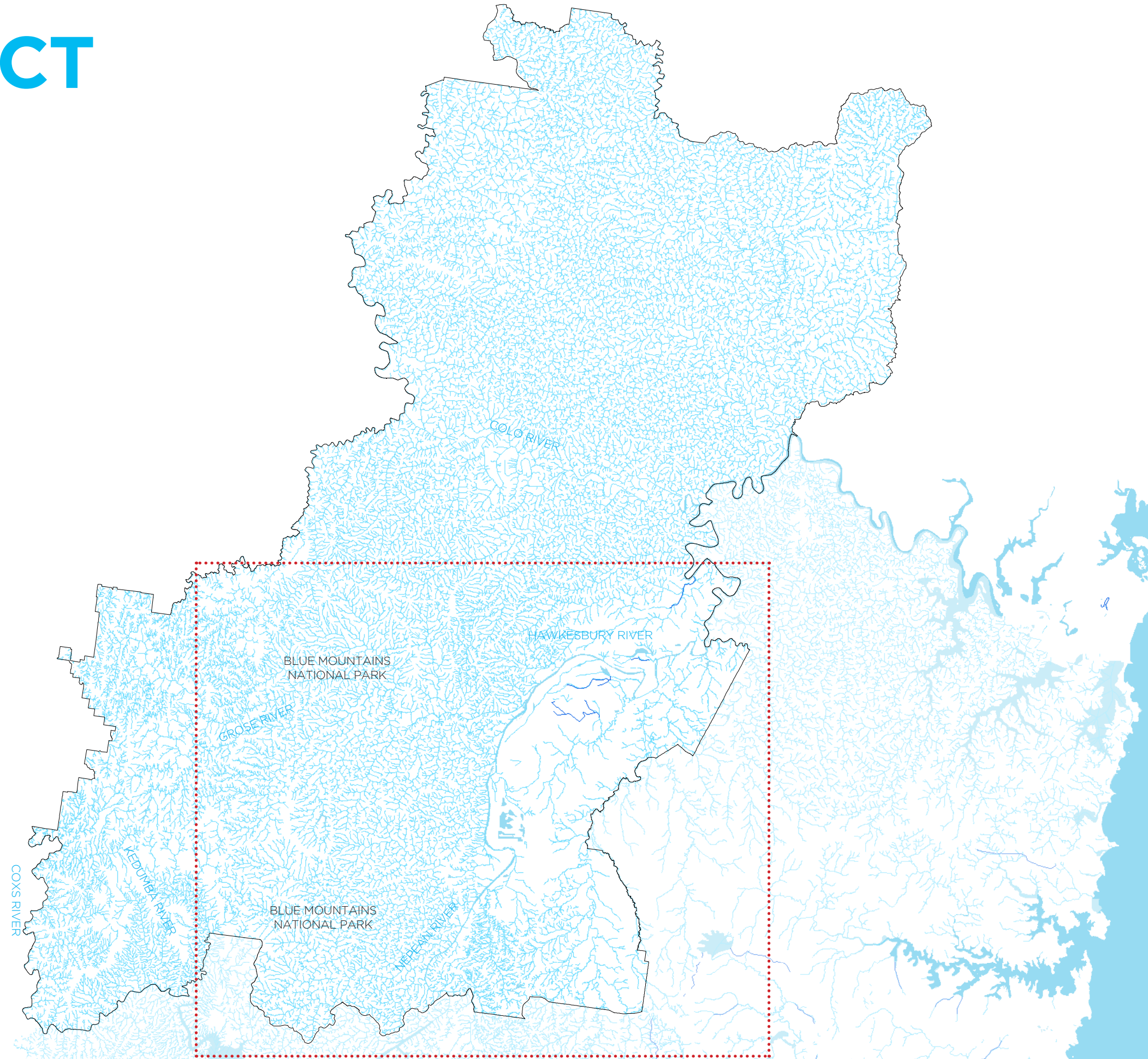
LEGEND

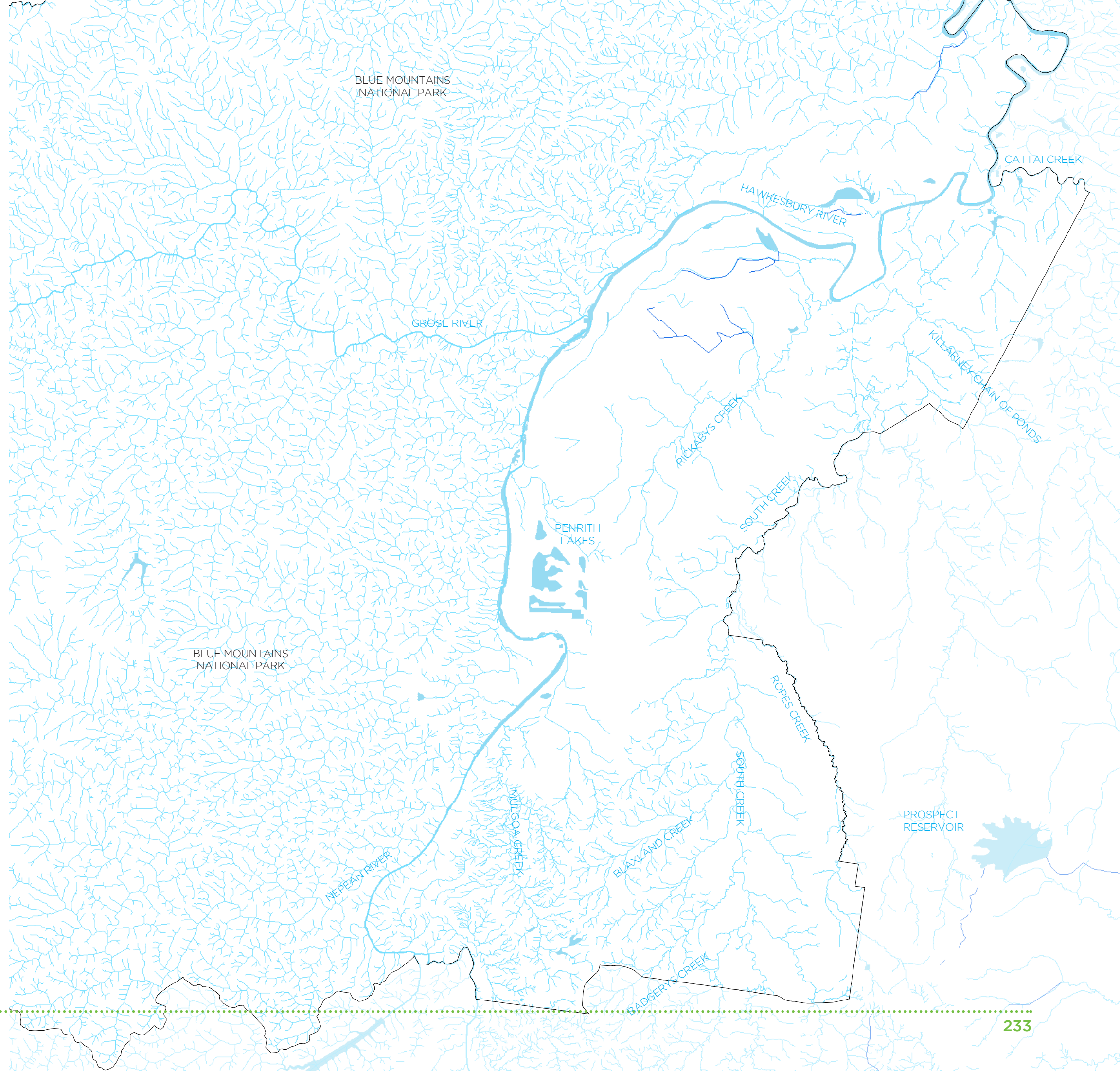
-  District Boundary
-  Concrete Canals
-  Rivers and Creeks
-  Water Bodies

SCALE 1:200,000 @ A1





0 1 2 3 4 5km

Figure W.5: West District Hydrological Grid Plan





LEGEND

-  District Boundary
-  Concrete Canals
-  Rivers and Creeks
-  Water Bodies

SCALE 1:80,000 @ A1



Figure W.6: West District Hydrological Grid Detail Plan

WEST DISTRICT

THE ECOLOGICAL GRID

The West District includes the Blue Mountains National Park and World Heritage Area, which is a major tourist attraction to the district, and listed as one of 16 of "Australia's most spectacular regions" by Australia's National Landscapes Program.

The Blue Mountains National Park is home to a diverse array of locally endemic flora and fauna species including threatened species, endangered populations and threatened ecological communities. Examples include *Acrophyllum australe*, *Pultenaea glabra*, *Epacris hamiltonii*, *Isopogon fletcheri*, Spotted-tailed Quoll, Broad-headed Snake, Blue Mountains Water Skink (mentioned above), Red-crowned Toadlet, Gang-gang Cockatoo, Scarlet Robin, endangered population of *Pultenaea villifera*, Blue Mountains Swamps (mentioned above), Blue Mountains Basalt Forest and Blue Mountains Shale Cap Forest.

Other National Parks and conservation reserves within the district include Wollemi, Yengo and Scheyville National Parks, Parr State Conservation Area, and Pitt Town, Windsor Downs, Agnes Banks, Castlereagh, Wianamatta and Mulgoa Nature Reserves.









Many areas of high biodiversity are protected in national parks and nature reserves, as well as on privately owned land managed for conservation purposes. The protection of biodiversity in the landscape provides a range of environmental, social and economic benefits. Detailed information on areas of high environmental is available from the Office of Environment and Heritage and councils. Where necessary, data and mapping of areas of high environmental value will be ground-truthed to improve accuracy.

The Office of Environment and Heritage has also developed a Biodiversity Investment Opportunities Map (BIO Map) for part of Greater Sydney. The BIO Map identifies priority areas for investment in bushland protection and restoration, comprising core areas of bushland and corridors, that are important at a state and regional level for biodiversity.

Connect biodiverse areas and apply planning and zoning provisions to protect corridors. Corridors aim to provide ecological connectivity, to facilitate the movement and dispersal of native flora and fauna across the landscape. Connecting biodiverse areas is particularly important in the face of climate change. Investigate opportunities to enhance native biodiversity in Green Grid corridors to help expand the urban forest to achieve canopy cover targets.

Protection and offsetting of impacts will be supported by innovative approaches such as Biodiversity Certification and Biodiversity Banking (BioBanking), both of which were supported by the Independent Biodiversity Legislation Review Panel, whose recommendations were endorsed by the NSW Government in early 2015.

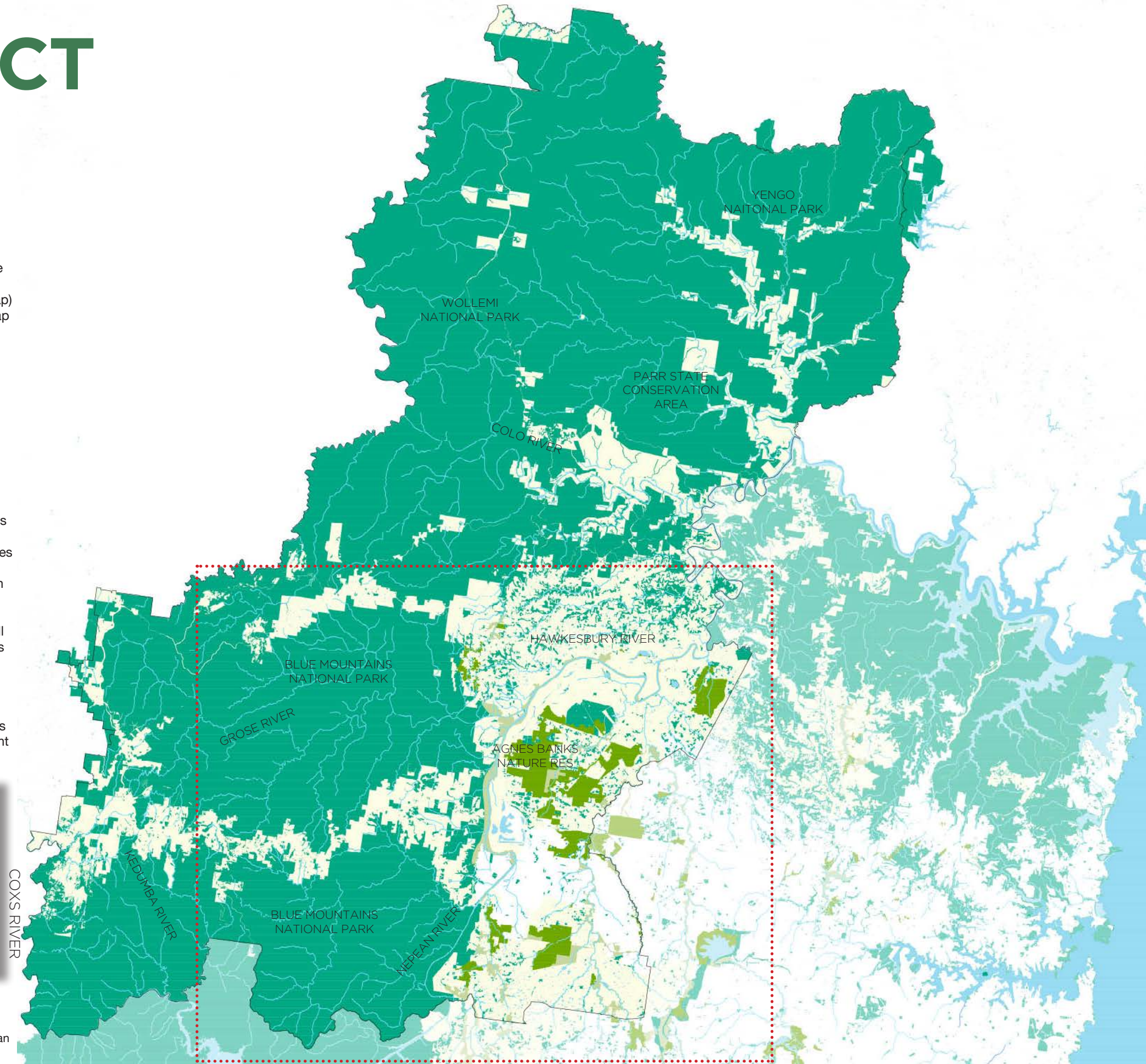
LEGEND

-  District Boundary
-  Concrete Canals
-  Rivers and Creeks
-  Water Bodies
-  BioMap Core Areas
-  BioMap Regional Corridors
-  High Environmental Lands
-  Metropolitan Rural Area

SCALE 1:200,000 @ A1

0 1 2 3 4 5km

Figure W.7: West District Ecological Grid Plan



The use of Biodiversity Certification in strategic locations is supported as it identifies areas of high conservation value at a landscape scale and these areas can be avoided and protected while identifying areas suitable for development.









The use of BioBanking is supported as it provides in-perpetuity funding and security to protect and enhance the biodiversity values of the protected area.

Engage local communities about the biological assets of their 'local patch of bush' to encourage active involvement in the protection and enhancement of bushland and other biodiversity. This will require engagement of local communities about the multiple benefits of their local bush and riparian areas and waterways and action to improve the ecological literacy to deepen the community perception of green infrastructure.

Volunteer and community groups are an important sector in the rehabilitation of native vegetation in urban areas. In recognition of the effort and funding dedicated to these areas, a level of protection should be provided through the planning process by applying appropriate provisions and mechanisms.

NOTE: Ecological Grid values and text provided in consultation with the Office of Environment and Heritage [OEH].

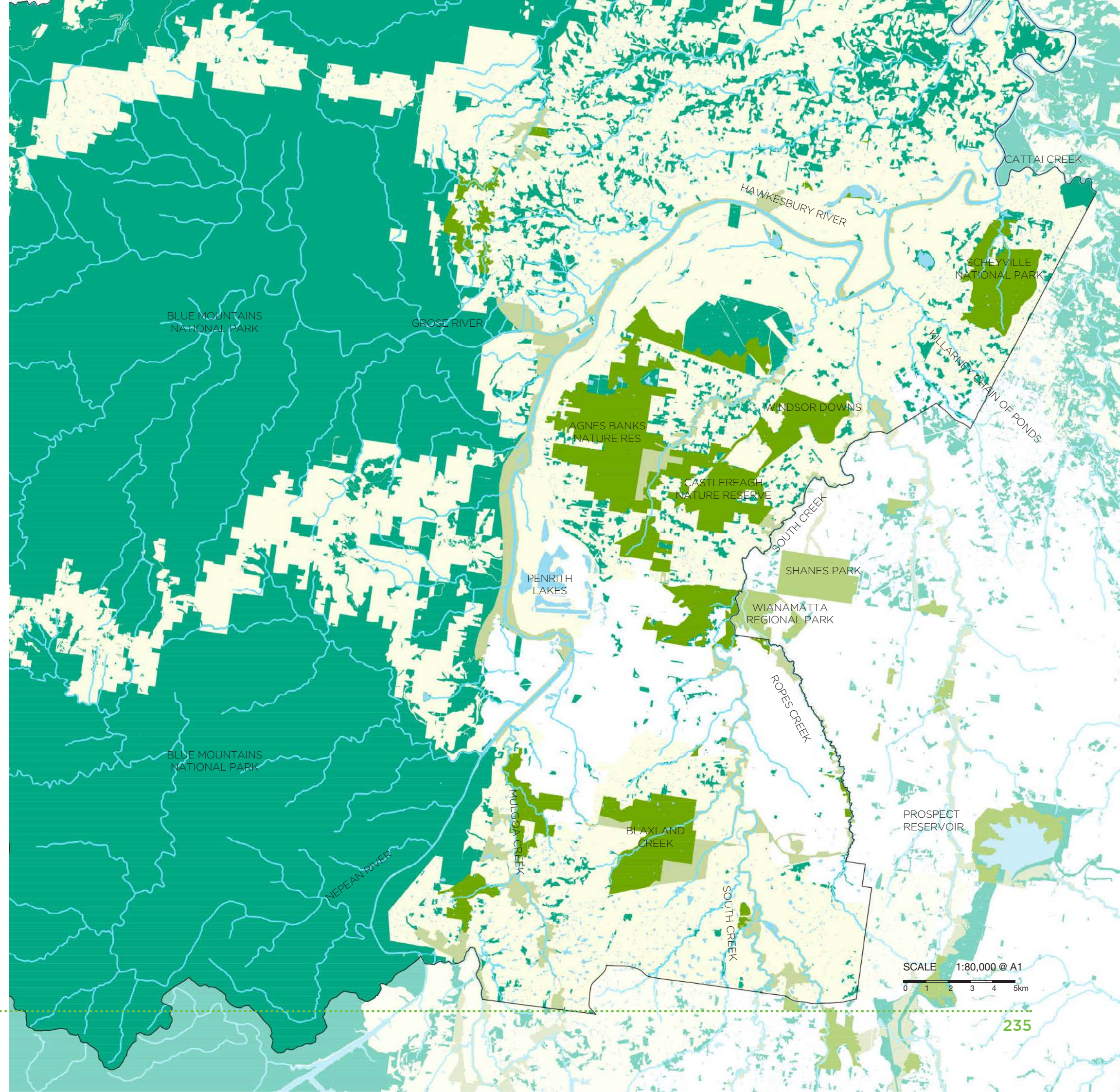
LEGEND

-  District Boundary
-  Concrete Canals
-  Rivers and Creeks
-  Water Bodies
-  BioMap Core Areas
-  BioMap Regional Corridors
-  High Environmental Lands
-  Metropolitan Rural Area

SCALE 1:80,000 @ A1



Figure W.8: West District Ecological Grid Detail Plan



WEST DISTRICT

THE RECREATIONAL GRID

RECREATION

Key features and findings regarding recreational open space planning for both passive and active sports are currently being analysed and will be described in collaboration with other consultancies.

HERITAGE

The West District includes world, state and local heritage areas, and important cultural facilities.






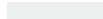


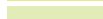




Places of heritage significance include WSU Hawkesbury campus, Penrith Lakes, Blue Mountains railway stations, Nepean River and the historic towns of Windsor, Richmond, Pitt Town, Wilberforce and Kurrajong. There is opportunity to promote heritage protection and tourism together.

The protection of important heritage places and landscapes from the early planning stages is important as these places contribute to the district's identity and provide a sense of place, history and visual character. They also contribute to the economy through the attraction of visitors. Heritage is a non-renewable resource and the significance of heritage to the community should be appreciated, valued, protected and conserved for the benefit of current and future generations.

Aboriginal cultural heritage is legally protected in NSW. Protecting Aboriginal heritage means far more than looking after sites in parks or artefacts in museums. Aboriginal people need to be consulted on the conservation of the natural environment and the development of areas.

Acknowledge heritage resources as a 'value addition' in urban development. This will include identifying significant heritage values and incorporating them into developments, including the adaptive reuse of heritage resources.

LEGEND

-  District Boundary
-  Concrete Canals
-  Rivers and Creeks
-  Water Bodies
-  Bushland
-  Civic
-  Parklands
-  Cemetery
-  Golf Course
-  Horse Racing
-  Sports
-  Cycleways Existing
-  Cycleways Proposed

SCALE 1:200,000 @ A1

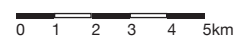
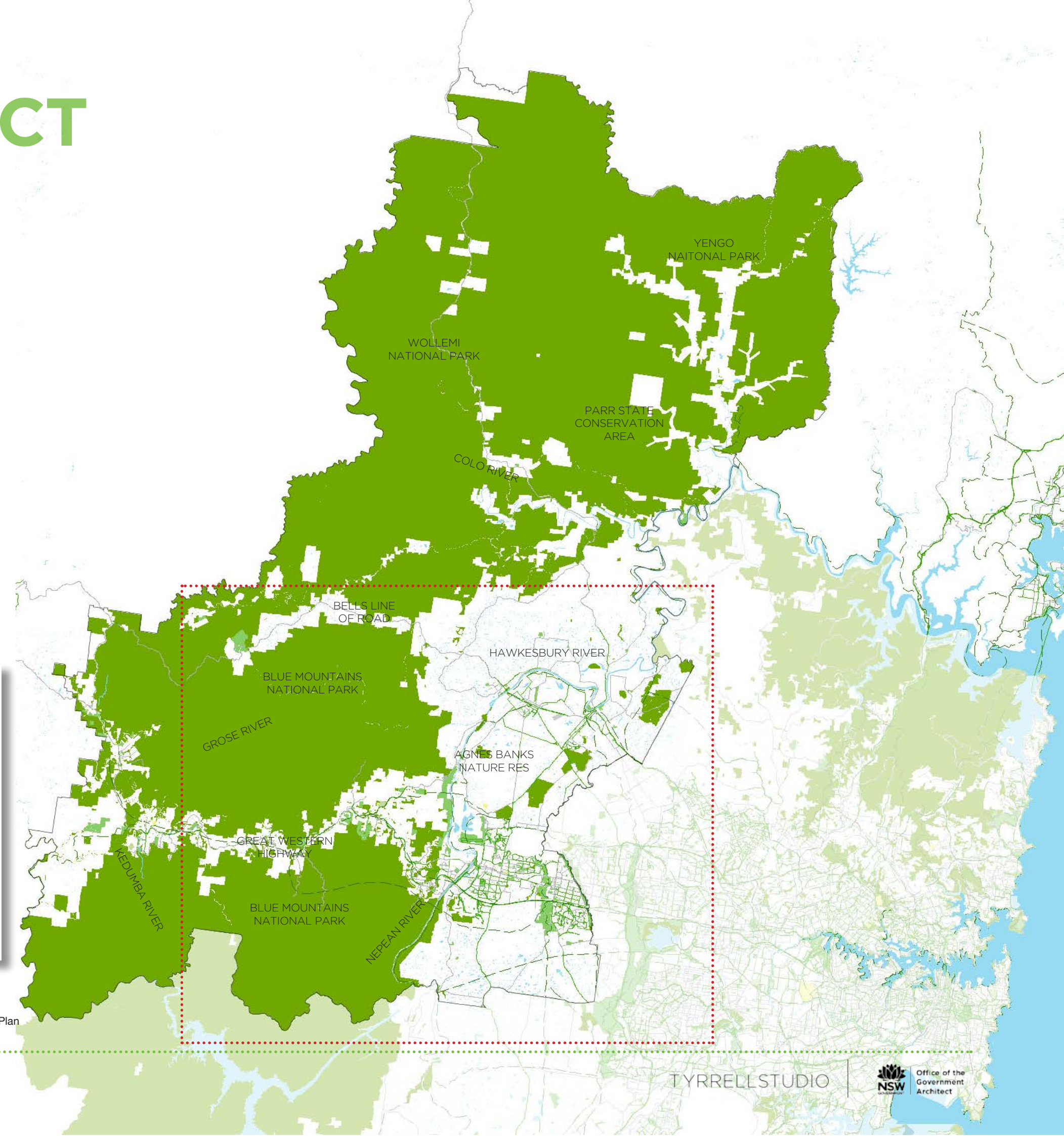















Figure W.9: West District Recreational Grid Plan





LEGEND

-  District Boundary
-  Concrete Canals
-  Rivers and Creeks
-  Water Bodies
-  Bushland
-  Civic
-  Parklands
-  Cemetery
-  Golf Course
-  Horse Racing
-  Sports
-  Cycleways Existing
-  Cycleways Proposed

SCALE 1:80,000 @ A1














Figure W.10: West District Recreational Grid Detail Plan

WEST DISTRICT

THE GREEN GRID EXISTING VALUES

The Existing Values plan represents a combination of the current values from the Hydrological, Ecological and Recreational Grids.

LEGEND

-  District Boundary
-  Concrete Canals
-  Rivers and Creeks
-  Water Bodies
-  BioMap Core Areas
-  BioMap Regional Corridors
-  High Environmental Lands
-  Metropolitan Rural Area
-  Public Open Space
-  Cycleways Existing
-  Cycleways Proposed

SCALE 1:200,000 @ A1

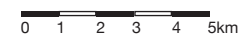
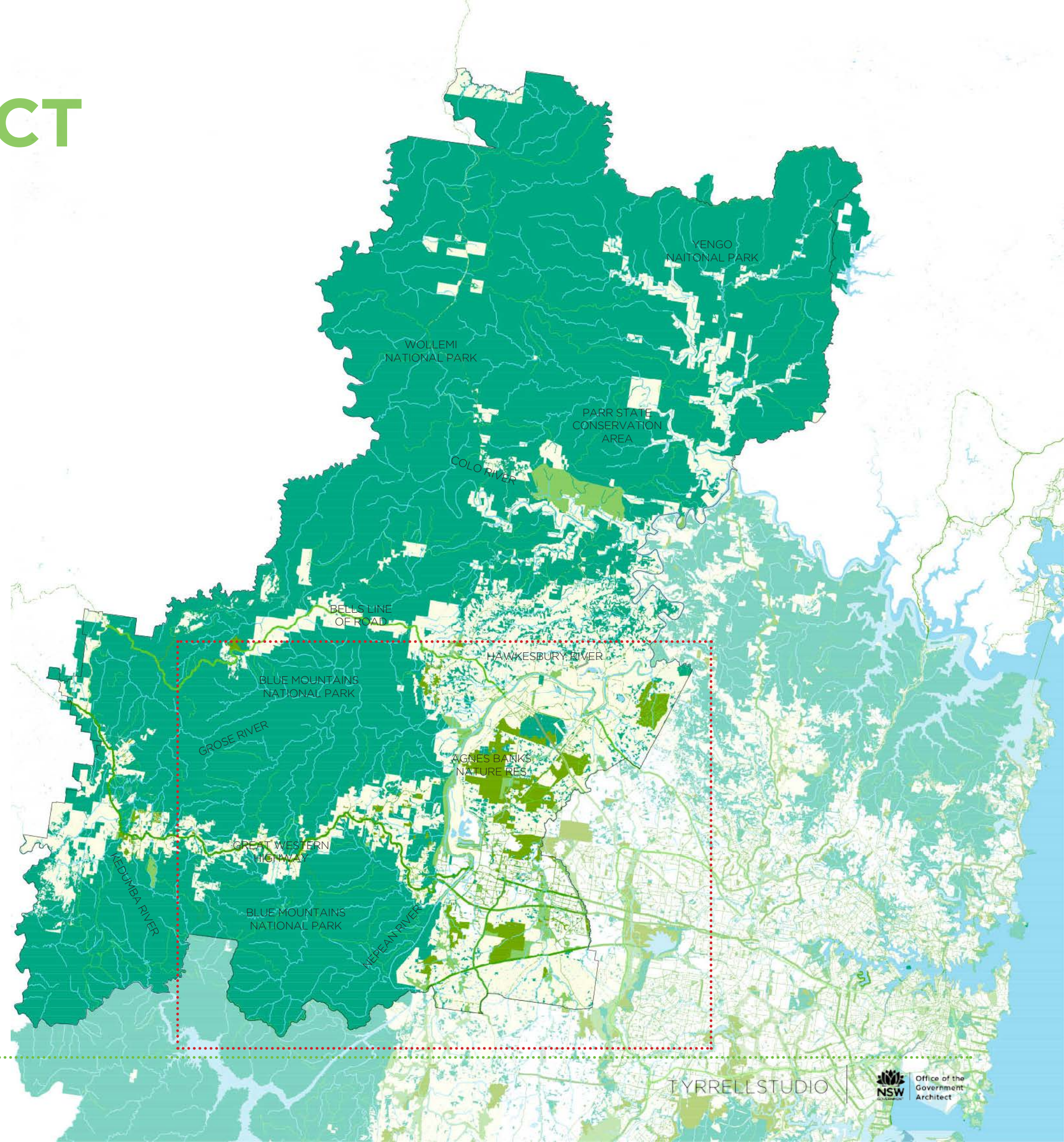
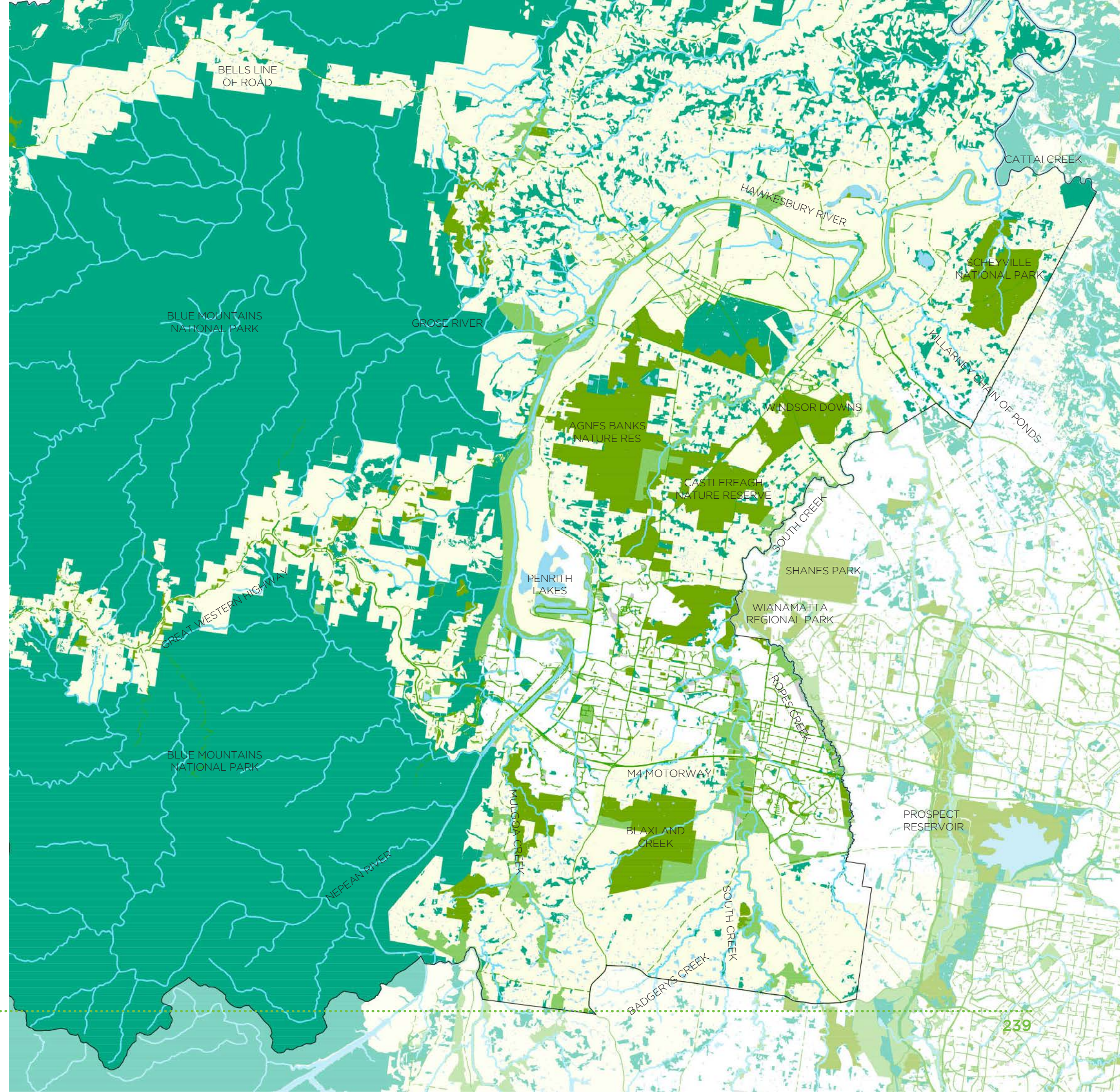













Figure W.11: West Green Grid Existing Values Plan





LEGEND

-  District Boundary
-  Concrete Canals
-  Rivers and Creeks
-  Water Bodies
-  BioMap Core Areas
-  BioMap Regional Corridors
-  High Environmental Lands
-  Metropolitan Rural Area
-  Public Open Space
-  Cycleways Existing
-  Cycleways Proposed

SCALE 1:80,000 @ A1



Figure W.12: West Green Grid Existing Values Detail Plan

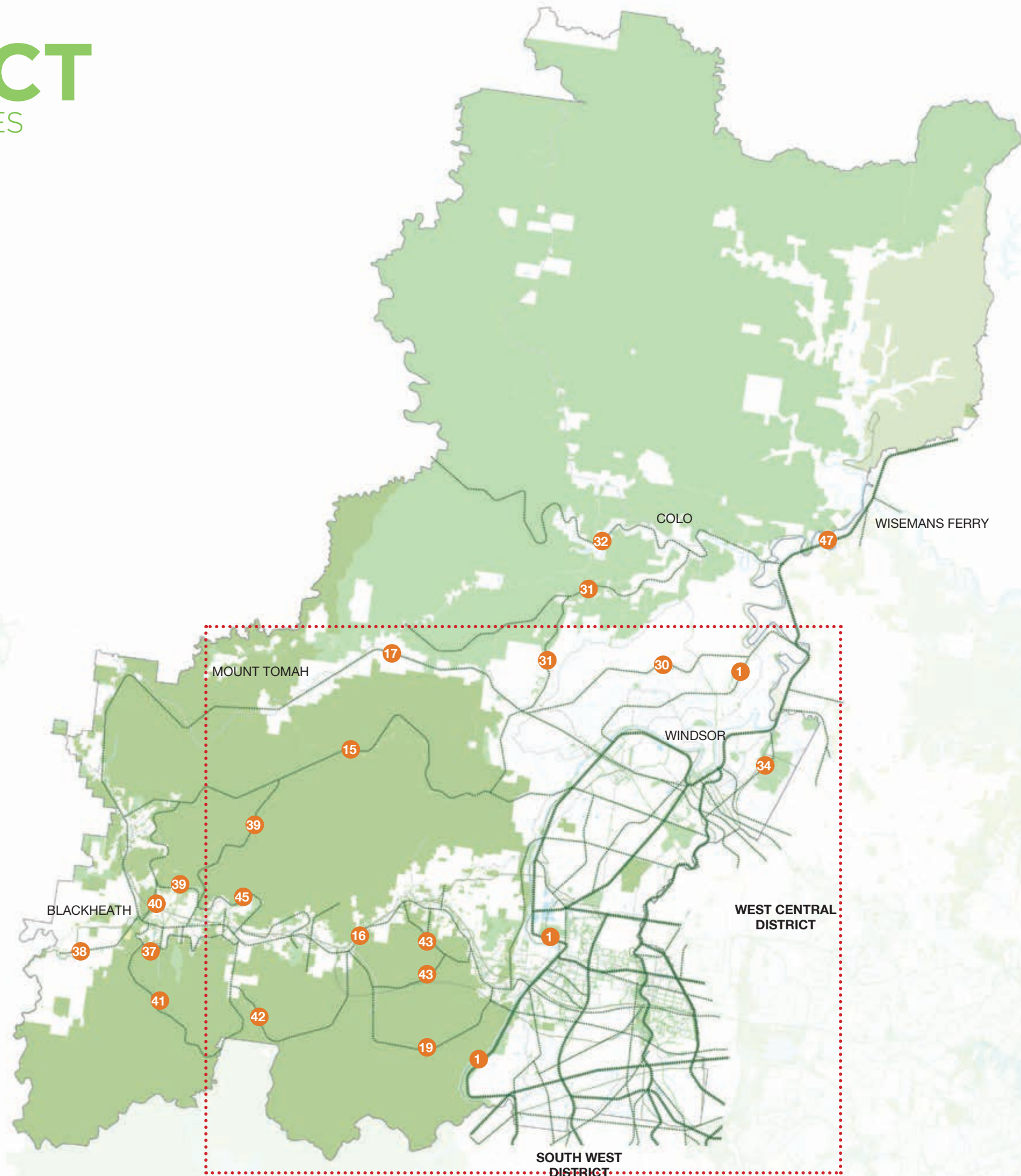
WEST DISTRICT

GREEN GRID PROJECT OPPORTUNITIES

The list of projects is a compilation of projects derived from the original Green Grid Reports together with the outcome from Greater Sydney Commission's District Plan Workshops and NSW Department of Planning and Environment Open Space Workshops.

This project list represents the projects identified by various interest groups and governments as potential priority projects. The projects are currently being assessed against the GIS data and work methodology as described previously.

The "Dominant Grid Layer" in the Project List refers to the infrastructure layer of the city that is most concerned with this project, and as a result may have funding allocated to it. This layer only represents the project as it currently exists and is not necessarily correlate to its future vision.



SCALE 1:200,000 @ A1

0 2 4 6 8 10km

Figure W.13: West Green Grid Project Opportunities

WEST DISTRICT: THE GREEN GRID PROJECT OPPORTUNITIES

PROJECT OPPORTUNITY	DOMINANT GRID LAYER
1. The Great River Walk: The Hawkesbury-Nepean River	HYDROLOGICAL
2. South Creek	HYDROLOGICAL
3. Ropes Creek	HYDROLOGICAL
4. Penrith Lakes Parklands	UTILITIES
5. Penrith CBD and Hospital to the River Green Links	RECREATIONAL
6. Great Western Highway: Penrith to Parramatta Easements	TRANSPORT
7. Great Western Highway: Penrith to Blackheath Cycle Link	TRANSPORT
8. Windsor to Richmond Green Link: Hamm Common	RECREATIONAL
9. Cranebrook to Windsor Downs Nature Reserve Corridor	ECOLOGICAL
10. Nepean Creeks incl. Mulgoa Ck and Surveyors Ck	HYDROLOGICAL
11. M4 Western Motorway Corridor Open Space	TRANSPORT
12. Penrith Rail Line Corridor from Penrith to Blacktown	TRANSPORT
13. Warragamba Pipeline Open Space Corridor	UTILITIES
14. Rickabys Creek Open Space Corridors	HYDROLOGICAL
15. Grose River Trail: Blackheath to Yarramundi Reserve	ECOLOGICAL
16. Blue Mountains Eco Tourism Trail and Destinations	ECOLOGICAL
17. Bells Line of Road Tourism Trail and Destinations	ECOLOGICAL
18. Eastern Escarpment Open Space and Trails	ECOLOGICAL
19. Woodford Dam and Woodford to Glenbrook Trail	UTILITIES
20. Blue Mountains Highway to Bushland WSUD Green Links	HYDROLOGICAL
21. Blue Mountains Villages to Bushland Green Links	RECREATIONAL
22. North West Rail Link Extension: Rouse Hill to St. Marys	TRANSPORT
23. South West Rail Link Extension: St. Marys to Badgerys Ck	TRANSPORT
24. M9 Outer Sydney Orbital	TRANSPORT
25. The Northern Road Green Blvde: Badgerys Ck to Penrith	TRANSPORT
26. Shanes Park and Wianamatta Regional Park	ECOLOGICAL
27. Windsor Town Centre Green Links	RECREATIONAL
28. Richmond Town Centre Green Links	RECREATIONAL
29. Blaxland Ck Bushland Reserve, Blaxland and Cosgrove Ck	HYDROLOGICAL
30. Kurrajong Trails: Howes and Currency Creeks	HYDROLOGICAL
31. Upper Kurrajong Trails: Little Wheeny Creek	HYDROLOGICAL
32. Colo River Trails	HYDROLOGICAL
33. Windsor Town Centre Nepean River Edge	RECREATIONAL
34. Scheyville National Park and Creeks	ECOLOGICAL
35. Agnes Banks Nature Reserve	ECOLOGICAL
36. Agnes Banks East West Links: The Driftway and Devlin Rd	ECOLOGICAL
37. The Great Blue Mountains Trail	ECOLOGICAL
38. Western Escarpment: Six Foot Track and Megalong Valley	ECOLOGICAL
39. Northern Escarpment: Grose Valley and Mount Hay	ECOLOGICAL
40. Cascade Creek Dam Open Space and Trails	HYDROLOGICAL
41. Jamieson Valley and Mt. Solitary Trails	ECOLOGICAL
42. Kings Tableland Bushland and Trails	ECOLOGICAL
43. Blue Labyrinth Open Space and Trails	ECOLOGICAL
44. Richmond to the River Green Link	RECREATIONAL
45. Wentworth Falls Lake, Bushland and Golf Course Trails	HYDROLOGICAL
46. McKenzies Creek and Killarney Chain of Ponds Corridor	HYDROLOGICAL
47. Hawkesbury River Trail: Windsor to Wisemans Ferry	HYDROLOGICAL
48. Glenmore Park Open Space Corridors	RECREATIONAL
49. Mulgoa Nature Reserve	ECOLOGICAL
50. Jamison Park and South Penrith Open Space Corridors	RECREATIONAL
51. Windsor Road Active Transport Corridor	TRANSPORT
52. Richmond Rail Line	TRANSPORT
53. M12 Motorway Green Boulevard	TRANSPORT

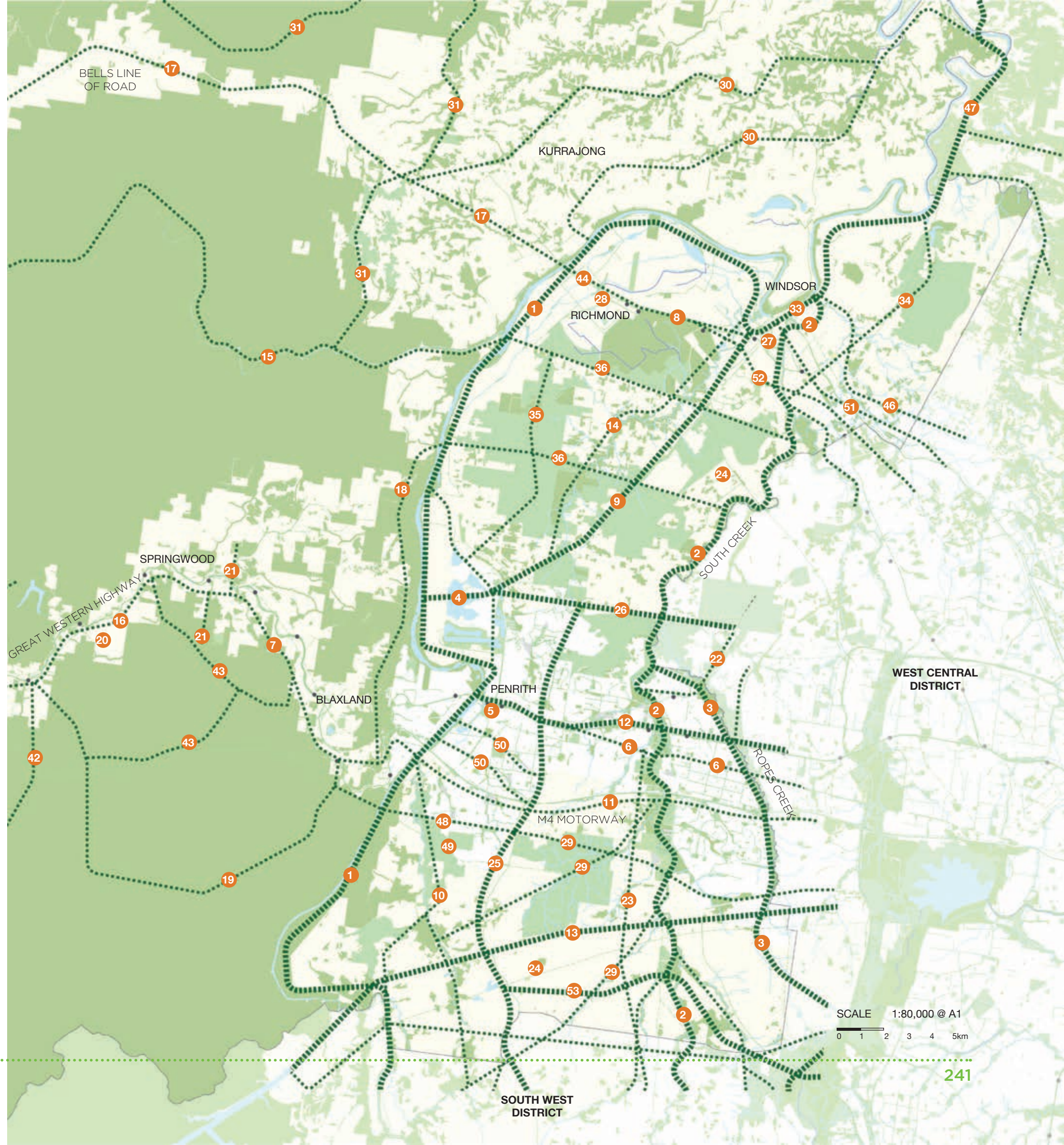
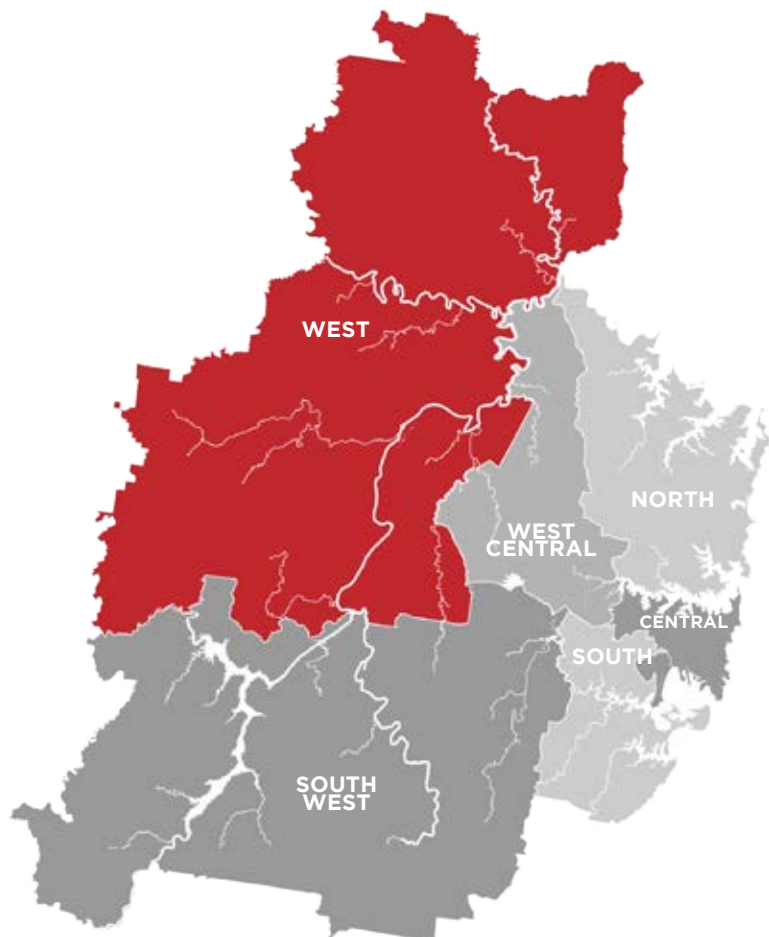


Figure W.14: West Green Grid Project Opportunities Detail



WEST

PROJECT OPPORTUNITIES



PROJECT PRIORITISATION METHODOLOGY

The Green Grid projects have been analysed against ten priority criteria. Each project has been given a total score which represents its level of priority in the Green Grid network. The ten criteria are:

- Existing ecological, hydrological and recreational value
- Regional potential to connect to other Green Grid projects
- Super District Scale potential to connect across Local Government Area and District Boundaries
- Projects proximity to development
- Projects with lands currently controlled by the Office of Strategic Lands (OSL)
- Projects identified by Local Council's as priorities during the Greater Sydney Commission's Technical Working Group process.
- Projects in regions with open space deficiency as identified in the Government Architect's Office Open Space Audit.
- Projects that overlap or provide important connections to NSW Department of Planning Priority Precincts.

Each project is given a total score based on the sum of the above values. Of the projects that score 10 or higher (of a possible 12), Priority projects were selected based on relevance to future development requirements and other Greater Sydney Commission and NSW Planning priorities. For each district two or three projects are selected and are highlighted dark green in the project prioritisation matrix. High scoring projects that are not deemed as Priority Projects combined with projects that score 8 or higher are defined as other important projects and are highlighted light green in the project prioritisation matrix. From the "other important projects" list a shortlist were selected for inclusion into the District Plans based on their immediate relevance to other Greater Sydney Commission and NSW Planning priorities.

WEST DISTRICT

PRELIMINARY PROJECT PRIORITISATION MATRIX

PRIORITY PROJECT CRITERIA		POTENTIAL PROJECT VALUES					OVERLAP & PROXIMITY VALUES					GREEN GRID PROJECT TYPE
PROJECT NAME	COUNT VALUE [CATEGORY WEIGHTING]	ECOLOGICAL VALUE [0-1]	HYDROLOGICAL VALUE [0-1]	RECREATIONAL VALUE [0-1]	CONNECTIVITY VALUE [0-2]	SUPER DISTRICT SCALE VALUE [0-2]	PROXIMITY TO DEVELOPMENT [0-1]	OSL LANDS OVERLAP [0-1]	GSC TWG FOCUS [0-1]	OPEN SPACE DEFICIENCY [0-1]	PRIORITY PRECINCT OVERLAP [0-1]	
WEST DISTRICT PROJECT OPPORTUNITIES												
1. The Great River Walk: The Hawkesbury-Nepean River	10	1	1	1	2	2		1	1	1		Waterway Corridor
2. South Creek	12	1	1	1	2	2	1	1	1	1	1	Waterway Corridor
3. Ropes Creek	12	1	1	1	2	2	1	1	1	1	1	Waterway Corridor
4. Penrith Lakes Parklands	8		1	1	2		1	1	1	1		Former Infrastructure
5. Penrith CBD and Hospital to the River Green Links	6			1	2		1		1	1		Urban Centre Street Links
6. Great Western Highway: Penrith to Parramatta Easements	7			1	2	2	1			1		Transport Corridors
7. Great Western Highway: Penrith to Blackheath Link	8			1	2	2	1		1	1		Transport Corridors
8. Windsor to Richmond Green Link: Hamm Common	4			1	2					1		Urban Centre Street Links
9. Cranebrook to Windsor Downs Nature Reserve Corridor	11	1	1	1	2	2		1	1	1	1	Ecological Lands
10. Nepean Creeks incl. Mulgoa Ck and Surveyors Ck	9	1	1	1	2		1		1	1	1	Waterway Corridor
11. M4 Western Motorway Corridor Open Space	7			1	2	2	1			1		Transport Corridors
12. Penrith Rail Line Corridor from Penrith to Blacktown	7			1	2	2	1			1		Transport Corridors
13. Warragamba Pipeline Open Space Corridor	9			1	2	2	1		1	1	1	Utilities Easements
14. Rickabys Creek Open Space Corridors	7	1	1	1	2				1	1		Waterway Corridor
15. Grose River Trail: Blackheath to Yarramundi Reserve	4	1	1	1					1			Ecological Lands
16. Blue Mountains Eco Tourism Trail and Destinations	7	1		1	2	2			1			Ecological Lands
17. Bells Line of Road Tourism Trail and Destinations	7	1		1	2	2			1			Ecological Lands
18. Eastern Escarpment Open Space and Trails	8	1	1	1	2		1		1	1		Ecological Lands
19. Woodford Dam and Woodford to Glenbrook Trail	6	1	1	1	2				1			Former Infrastructure
20. Blue Mountains Highway to Bushland WSUD Green Links	7	1	1	1	2		1		1			Waterway Corridor
21. Blue Mountains Villages to Bushland Green Links	7	1	1	1	2		1		1			Urban Centre Street Links
22. North West Rail Link Extension: Rouse Hill to St. Marys	8			1	2	2	1			1	1	Transport Corridors
23. South West Rail Link Extension: St. Marys to Badgerys Creek	8			1	2	2	1			1	1	Transport Corridors
24. M9 Outer Sydney Orbital	7				2	2			1	1	1	Transport Corridors
25. The Northern Road Green Boulevard: Badgerys Creek to Penrith	9	1		1	2	2	1			1	1	Transport Corridors
26. Shanes Park and Wianamatta Regional Park	10	1	1	1	2		1	1	1	1	1	Ecological Lands
27. Windsor Town Centre Green Links	5			1	2		1			1		Urban Centre Street Links
28. Richmond Town Centre Green Links	5			1	2		1			1		Urban Centre Street Links
29. Blaxland Creek and Bushland Reserve	8	1	1	1	2		1			1	1	Waterway Corridor
30. Kurrajong Trails: Howes and Currency Creeks	4	1	1	1						1		Waterway Corridor
31. Upper Kurrajong Trails: Little Wheeny Creek	4	1	1	1						1		Waterway Corridor
32. Colo River Trails	3	1	1	1								Waterway Corridor
33. Windsor Town Centre Nepean River Edge	7		1	1	2		1		1	1		Mixed Open Space Corridor
34. Scheyville National Park and Creeks	6	1	1	1	2					1		Ecological Lands
35. Agnes Banks Nature Reserve	8	1	1	1	2	2				1		Ecological Lands
36. Agnes Banks East West Links: The Driftway and Devlin Rd	4	1		1	2							Mixed Open Space Corridor
37. The Great Blue Mountains Trail	8		1	1	2	2	1			1		Mixed Open Space Corridor
38. Western Escarpment: Six Foot Track and the Megalong Valley	3	1	1	1								Ecological Lands
39. Northern Escarpment: Grose River Valley	5	1	1	1		2						Ecological Lands
40. Cascade Creek Dam Open Space and Trails	5	1	1	1	2							Ecological Lands
41. Jamieson Valley and Mt. Solitary Trails	5	1	1	1	2							Ecological Lands
42. Kings Tableland Bushland and Trails	5	1	1	1	2							Ecological Lands
43. Blue Labyrinth Open Space and Trails	5	1	1	1	2							Ecological Lands
44. Richmond to the River Green Link	6		1	1	2		1			1		Mixed Open Space Corridor
45. Wentworth Falls Lake, Bushland and Golf Course Trails	3	1	1	1								Mixed Open Space Corridor
46. McKenzies Creek and Killarney Chain of Ponds Corridor	6	1	1	1	2					1		Waterway Corridor
47. Hawkesbury River Trail: Windsor to Wisemans Ferry	7	1	1	1	2				1	1		Waterway Corridor
48. Glenmore Park Open Space Corridors	6		1	1	2		1			1		Parkland Corridors
49. Mulgoa Nature Reserve	7	1	1	1	2		1			1		Ecological Lands
50. Jamison Park and South Penrith Open Space Corridors	5		1	1	2					1		Parkland Corridors
51. Windsor Road Active Transport Corridor	7			1	2	2	1				1	Transport Corridors
52. Richmond Rail Line	7			1	2	2	1				1	Transport Corridors
53. M12 Motorway Green Boulevard	8			1	2	2	1			1	1	Transport Corridors

NOTE: Ropes Creek has also been identified as an important project in the West Central District Report. Please refer to the detailed plans in the West Central District Report for more information.



Nepean River

WEST DISTRICT

PRIORITY PROJECTS FOR FURTHER SCOPING

The following important Green Grid project opportunities have been selected for further scoping. The selected projects represent a mix of Priority and other important Green Grid projects. The selected projects also represent a mix of project types including projects with hydrological, ecological, recreational, transport and utility infrastructure values. The projects selected for further scoping may not represent the highest priority projects but aim to further understand the potential issues around different project types.



1. SOUTH CREEK

South Creek is a major tributary of the Hawkesbury-Nepean River, starting from Narellan in the South West District, it flows north all the way to Windsor where it connects to the Hawkesbury River. It runs over 50km and passes through more than 20 suburbs. The water quality of South Creek has a major impact on the Hawkesbury River and it also has important ecological communities along its banks. The project aims to create a continuous open space corridor along the entirety of South Creek that provide ecological protection and enhancement, improved stormwater treatment and a regionally significant recreation and active transport corridor for Western Sydney. The project passes through the South West Growth Area and will act as a major open space corridor for the future development of the region.

2. WARRAGAMBA PIPELINE

The Warragamba Pipeline is the major drinking water pipeline from Warragamba Dam to Prospect Reservoir. This project aims to use surplus easement lands for recreational open space, urban greening and walking and cycling trails. This project would provide a significant amount of linear open space through the South West Growth Centre connecting to Mulgoa, Badgerys Creek, Kemps Creek, Blaxland Creek and Horsley Park.

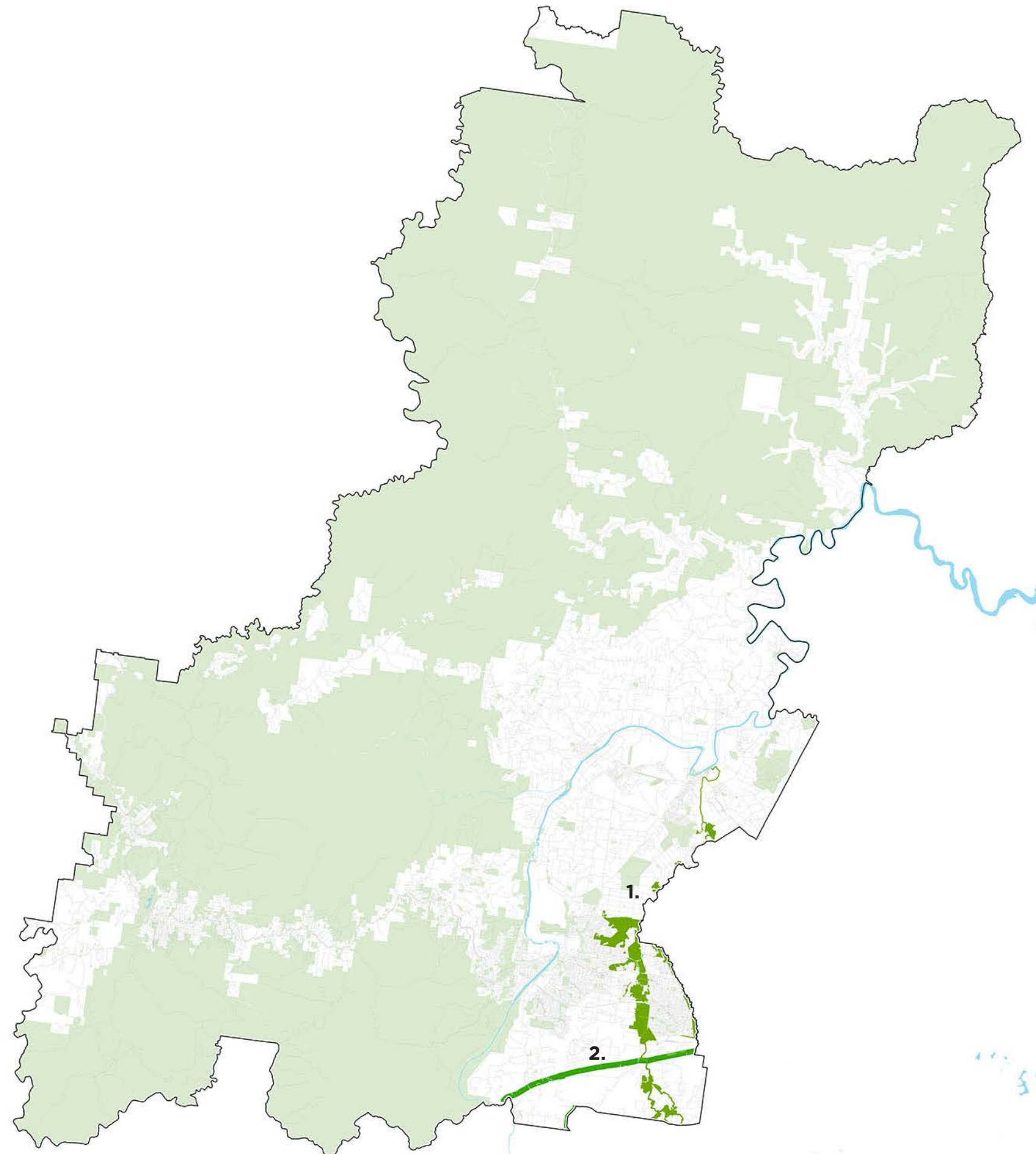


Figure W.15: West Preliminary Priority Projects Plan

SOUTH CREEK

WEST: PRIORITY PROJECT



South Creek is a major tributary of the Hawkesbury-Nepean River, starting from Narellan in the South West District, it flows north all the way to Windsor where it connects to the Hawkesbury River. It runs over 50km and passes through more than 20 suburbs. The water quality of South Creek has a major impact on the Hawkesbury River and it also has important ecological communities along its banks. The project aims to create a continuous open space corridor along the entirety of South Creek that provide ecological protection and enhancement, improved stormwater treatment and a regionally significant recreation and active transport corridor for Western Sydney. The project passes through the South West Growth Area and will act as a major open space corridor for the future development of the region.

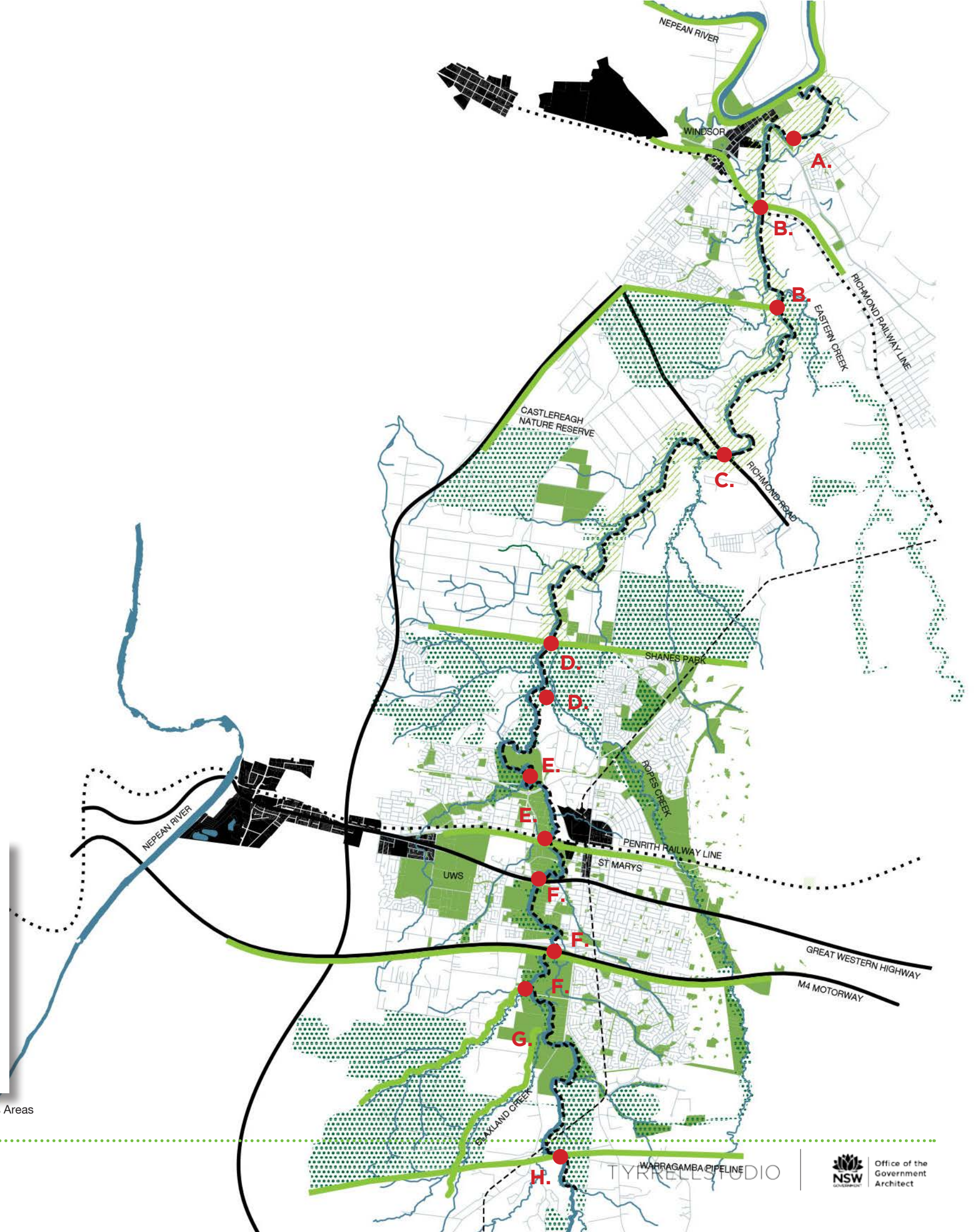
POTENTIAL FOCUS AREAS

- A.** Bridge Street, Windsor
- B.** Richmond Rail Line and Hawkesbury Valley Way
- C.** Richmond Road, Windsor Downs
- D.** Shanes Park and Ropes Crossing
- E.** Dunheved St, Penrith Rail Line and Great Western Highway, St Marys
- F.** M4 Motorway, Claremont Meadows
- G.** Blaxland Creek and Blaxland Nature Reserve
- H.** Warragamba Pipeline

LEGEND

- Existing Roads
- Existing Rail Lines
- Local Streets
- Waterways
- Green Grid Projects
- Existing Open Space
- High Environmental Lands
- Key Opportunity Sites
- Potential Open Space

Figure W.16: South Creek Potential Focus Areas











IMPORTANT CROSS CONNECTIONS

The important cross connections for this project include existing and potential connections into surrounding neighbourhoods and to adjacent Green Grid project opportunities.

The connections include existing roads, infrastructure corridors, creek lines, open space corridors and potential future street structures where projects intersect with priority precincts. This diagram is intended to highlight the priority connections that should be investigated in any future project scoping.

LEGEND

-  Existing Roads
-  Existing Rail Lines
-  Local Streets
-  Waterways
-  Green Grid Projects
-  Existing Open Space
-  High Environmental Lands
-  Important Cross Connections

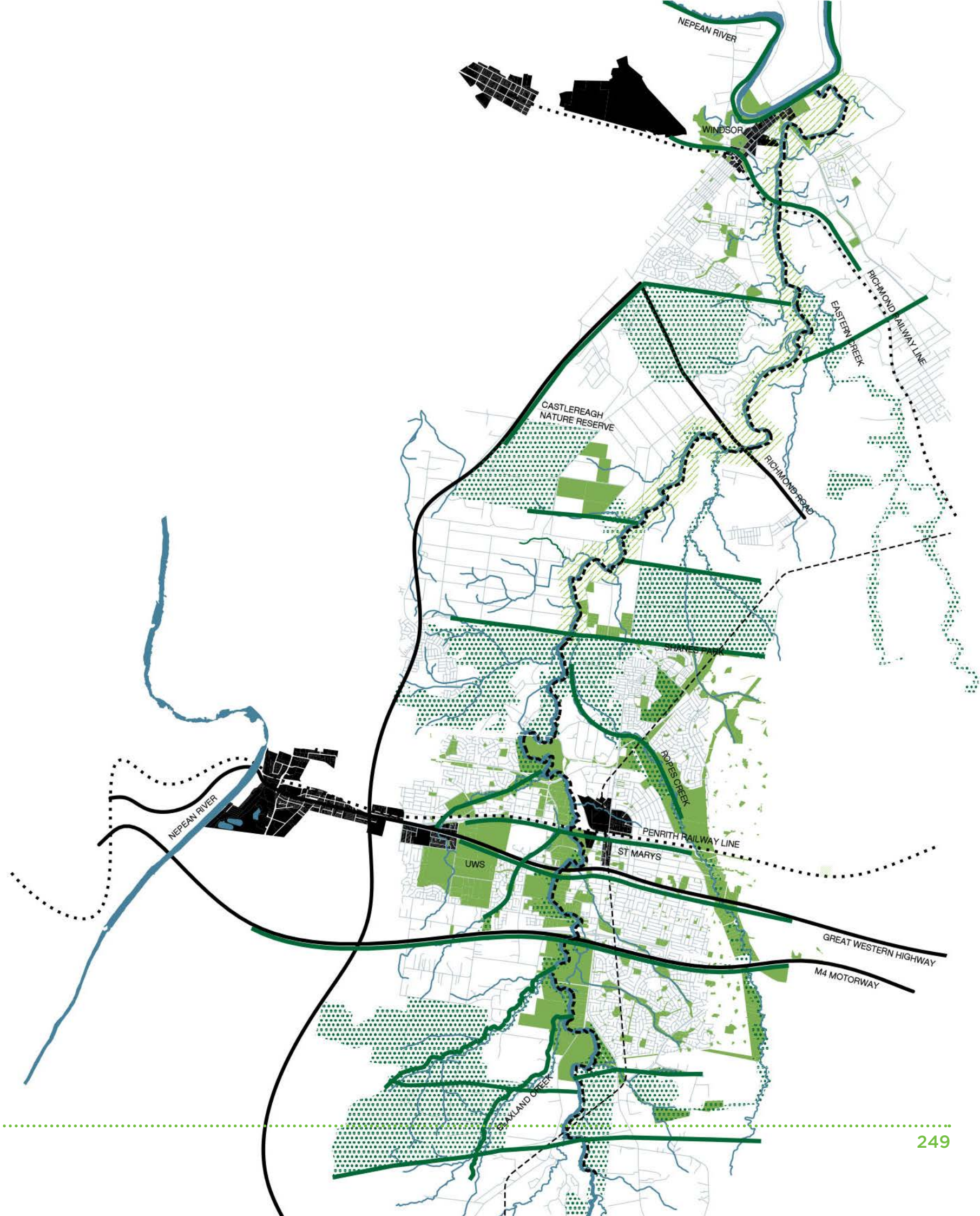


Figure W.17: South Creek Potential Important Cross Connections

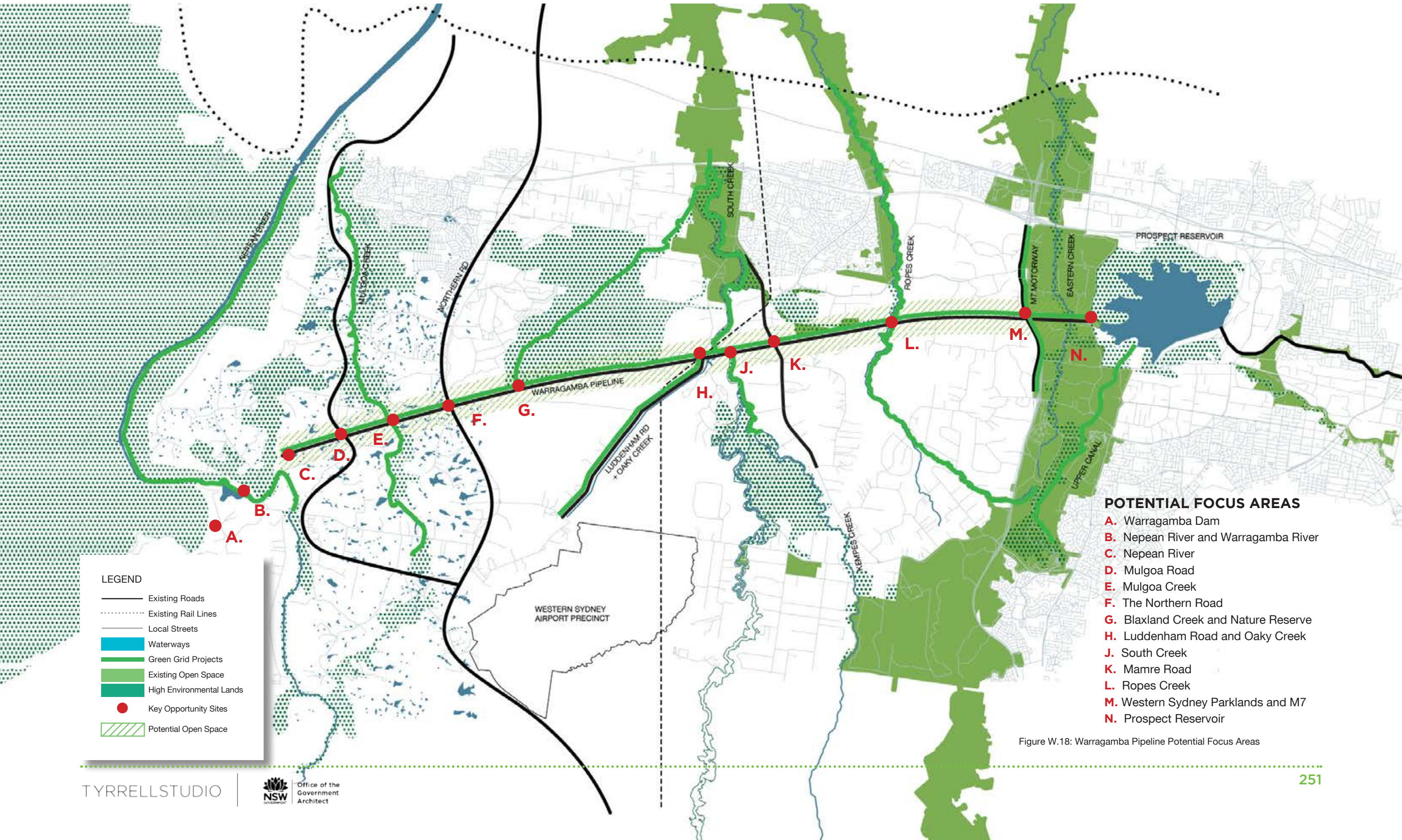
THE WARRAGAMBA PIPELINE

WEST: IMPORTANT PROJECT



The Warragamba Pipeline is the major drinking water pipeline from Warragamba Dam to Prospect Reservoir. This project aims to use surplus easement lands for recreational open space, urban greening and walking and cycling trails. This project would provide a significant amount of linear open space through the South West Growth Centre connecting to Mulgoa, Badgerys Creek, Kemps Creek, Blaxland Creek and Horsley Park.

KEY OPPORTUNITIES



LEGEND

- Existing Roads
- ⋯ Existing Rail Lines
- Local Streets
- Waterways
- Green Grid Projects
- Existing Open Space
- High Environmental Lands
- Key Opportunity Sites
- ▨ Potential Open Space

POTENTIAL FOCUS AREAS

- A.** Warragamba Dam
- B.** Nepean River and Warragamba River
- C.** Nepean River
- D.** Mulgoa Road
- E.** Mulgoa Creek
- F.** The Northern Road
- G.** Blaxland Creek and Nature Reserve
- H.** Luddenham Road and Oaky Creek
- J.** South Creek
- K.** Mamre Road
- L.** Ropes Creek
- M.** Western Sydney Parklands and M7
- N.** Prospect Reservoir

Figure W.18: Warragamba Pipeline Potential Focus Areas

WEST DISTRICT

OTHER IMPORTANT GREEN GRID OPPORTUNITIES



Penrith Lakes Parklands

Penrith Lakes Parklands, a former sand and gravel quarry, will be a regionally significant lakes and open space project for Western Sydney. This project aims to create a diverse open space parklands and waterway facilities, around the lakes and along the Nepean River. The project, in tandem with development with the Penrith Lakes precinct and Penrith Town Centre to support the needs of a growing population, will include high quality public domain pedestrian and cycle links from Penrith, linking the key centre with the Penrith Lakes precinct. It will have important links with the Great River Walk project,



Ropes Creek

Ropes Creek has also been identified as an important project in the West Central District Report. Please refer to the detailed plans in the West Central District Report for more information.

Ropes Creek is an important creek corridor for the West and West Central Districts, and runs for 20km from Cecil Hills and the Western Sydney Parklands north-west to Wianamatta Regional Park and Shanes Park. It is a major tributary to South Creek, and has important threatened ecological communities along its length. This project aims to protect and enhance the ecologically valued lands, improve water quality and stormwater runoff, and provide a diverse and connected sequence of recreational open spaces, walking and cycling trails. The project aims to create a green link that connects nearby suburbs including Cecil Hills, Erskine Park, Minchinbury, Mount Druitt, Oxley Park, St. Marys and Ropes Crossing.



Cranebrook to Windsor Downs Nature Reserve Corridor

The Cranebrook to Windsor Nature Reserve Corridor is a sequence of large and important Nature Reserves including Wianamatta Nature Reserve, Castlereagh Nature Reserve and Windsor Downs Nature Reserve. The project aims to protect and enhance these regionally significant ecological communities and connect them to improve resilience. The project will also improve the water quality and treatment of stormwater along Rickaby's Creek. It will provide a continuous open space corridor from Cranebrook to Windsor and South Creek, including recreation facilities, walking and cycling trails. This project will have important links with the Penrith Lakes Parklands, South Creek, Ropes Creek and Agnes Banks Nature Reserve Projects.



Great Western Highway: Penrith to Blackheath Active Transport Corridor

This project provides a major east west active transport corridor, from Penrith to Blackheath. This corridor will connect to the major centres along the route, including Penrith, Glenbrook, Blaxland, Springwood, Lawson, Woodford, Wentworth Falls, Katoomba and Blackheath. This project will provide a safe and separated walking and cycling trail along the corridor the takes in views along the mountain escarpments.



The Great River Walk: The Hawkesbury-Nepean River

Includes two related Green Grid projects; Nepean River Bridge to Bridge Trail (Penrith to Windsor); and Hawkesbury River Bridge to Bridge Trail (Windsor to Wisemans Ferry).

The Great River Walk project aims to provide a connected open space corridor along the Hawkesbury-Nepean River from Camden to Windsor. This is a major project that includes rural and urban lands and stretches for more than 50km. The project aims to protect, enhance and connect important ecological communities, improve water quality and stormwater treatment from nearby development, increase public access to the river edges, create a series of connected public open spaces and walking and cycling trails along the length of the river. The project will also improve river crossings, including the Nepean River Green Bridge at Penrith.



Shanes Park and Wianamatta Regional Park

Shanes Park and Wianamatta Regional Park are important nature reserves that are important threatened ecological communities that have important connections to South and Ropes Creeks.



Nepean Creeks: Peach Tree, Mulgoa and Surveyors Creeks

Includes related project: Mulgoa Nature Reserve

This collection of creeks and open space corridors are tributaries of the Nepean River throughout Mulgoa and Glenmore Park. Together with Mulgoa Nature Reserve they represent an important series of threatened ecological communities and hydrological systems for the region. The project aims to enhance and protect these assets and increase public access and recreational opportunities along the corridors. The project will include urban greening, recreational open space, walking and cycling trails and stormwater management along the creeks and nature reserves.

Eastern Escarpment Open Space and Trails

The Eastern Escarpment is the defining landform that marks the edge of the Sydney Basin and the start of the Great Dividing Range. Along the Nepean River there are large areas of threatened ecological communities and creek corridors. The project aims to connect a series of recreational and tourist open space facilities along the escarpment, maximising it's unique landscape and views.

Blaxland Creek and Bushland Reserve

The Blaxland Creek and nearby bushland are important open spaces for the future South West Growth Centre development. Blaxland Creek is an important tributary of South Creek.



Penrith Lakes

BIBLIOGRAPHY

Publications

ARUP (April 2014), Cities Alive Rethinking green infrastructure, ARUP.

Astell-Burt, T., Feng, X., Kolt, G.S. (2013), Green space is associated with walking and moderate-to-vigorous physical activity (MPVA) in middle-to-older-aged adults: findings from 203 883 Australians in the 45 and Up Study, *BMJ*.

Astell-Burt, T., Feng, X., Kolt, G.S. (2013), "Mental health benefits of neighbourhood green space are stronger among physically active adults in middle-to-older-age: Evidence from 260,061 Australians" in *Preventative Medicine*, vol. 57, pp601-606.

Australian Government Department of Infrastructure and Transport Major Cities Unit (2011), Our Cities, Our Future - A National Urban Policy Framework for a productive, sustainable and liveable future http://www.infrastructure.gov.au/infrastructure/pab/files/Our_Cities_National_Urban_Policy_Paper_2011.pdf

Australian Government Department of Infrastructure and Transport Major Cities Unit, State of Australian Cities 2013, <http://www.infrastructure.gov.au/infrastructure/pab/soac/>

Commission for Architecture and the Built Environment (CABE) (2004), Green space strategies a good practice guide, CABE. <http://webarchive.nationalarchives.gov.uk/20110118095356/http://www.cabe.org.uk/files/green-space-strategies.pdf>

Ely, M. and Pitman, S. (2012), Green Infrastructure, Life support for human habitats, The compelling evidence for incorporating nature into urban environments, Green Infrastructure Project, Botanic Gardens of Adelaide, SA Department of Environment, Water and Natural Resources.

Evans, C. and Freestone, R.¹ (2009), Green Regional Design: Philosophies, policies

and products in the evolution of metropolitan open space in Sydney 1948-2008, University of Melbourne, Victoria, University of New South Wales (UNSW).

Evans, C. and Freestone, R.² (2010) 'From Green Belt to Green Web: Regional Open Space Planning in Sydney 1948-1963', *Planning Practice & Research*, 25(2), 221-238.

Evans, C. and Freestone, R.³ (2011), Policy Challenges for Metropolitan Greenspace in Sydney, Paper presented to the SOAC Conference, UNSW.

Evans, C. and Freestone, R.⁴ (2012), Greenspace for Sydney over the next 20 years: Submission on the Discussion Paper, UNSW.

Infrastructure NSW (2011), The State Infrastructure Strategy 2012-2032.

Jacobs, B., Mikhailovich, N., and Delaney, C., 2014, Benchmarking Australia's Urban Tree Canopy: An i-Tree Assessment, prepared for Horticulture Australia Limited by the Institute for Sustainable Futures, University of Technology Sydney

Naumann, S., McKenna, D., Kaphengst, Pieterse, M., Rayment, M. (2011), Design, implementation and cost elements of Green Infrastructure projects, Final report Brussels, European Commission.

Mitchell, R., Astell-Burt, T. & Richardson, E.A. (2011), "A comparison of green space indicators for epidemiological research" in *J Epidemiol Community Health*, 2011, vol. 65, pp853-858.

NSW Department of Planning (DoP) (December 2010), Recreation and Open Space Planning Guidelines For Local Government, DoP.

NSW Department of Planning & Infrastructure (DP&I) (March 2013), Draft Metropolitan Strategy for Sydney to 2031

<http://strategies.planning.nsw.gov.au/MetropolitanStrategyforSydney/Aboutthestrategy.aspx>

DP&I (December 2012), NSW Long Term Transport Master Plan <http://www.transport.nsw.gov.au/sites/default/files/b2b/publications/nsw-transport-masterplan-final.pdf>

DP&I (April 2013), White Paper - A new planning system for NSW <http://www.planning.nsw.gov.au/en-us/policyandlegislation/previousstagesofplanningreview/whitepaper.aspx>

NSW Department of Infrastructure, Planning and Natural Resources, (2004), Assessing recreation demand and Opportunities Southern Sydney Region, Summary report http://www.infrastructure.nsw.gov.au/pdfs/SIS_Report_Complete_Print.pdf

Veal, A.J. (2013), "Open space planning standards in Australia: in search of origins" in *Australian Planner* 50:3, 224-232.

Spirn, A.W. (1984), *The Granite Garden: urban Nature and Human Design*, New York, Basic Books.

Spirn, A.W. (1994), "The International Conference on the Economic, Social, and Environmental Problems of Cities: The Impact and Next Steps" in *Cities for the 21st Century*, Paris: Organization for Economic Co-operation and Development.

Spirn, A.W. (1998), *The Language of Landscape*, New Haven: Yale University Press.

Funding programs / projects

Australian Governments Green Army Programme <http://www.environment.gov.au/land/green-army>

DP&I (1990) Metropolitan Greenspace Program <http://www.planning.nsw.gov.au/en-us/planningyourregion/fundingprograms/metropolitangreenspaceprogram.aspx>

DP&I Regional Recreation Tracks and Trails Framework (Metropolitan Greenspace Program)

P&I, Environmental Protection Agency (EPA), Sydney Coastal Councils Group, Western Sydney Regional Organisation of Councils (WSROC) Towards a Resilient Sydney

NSW Office of Environment & Heritage (OEH) Green Corridors Program <http://www.environment.nsw.gov.au/conservationprograms/greencorridors.htm>

OEH, Linking Landscapes Through Local Action project (Green Corridors Program) <http://www.environment.nsw.gov.au/conservationprograms/linkinglandscapes.htm>

OEH, The Growth Centres Biodiversity Offset Program (Green Corridors Program) <http://www.environment.nsw.gov.au/biocertification/GrowthCentres.htm>

OEH, National Parks Establishment Plan (Green Corridors Program) <http://www.environment.nsw.gov.au/protectedareas/npestabplan.htm>

IMAGE CREDITS

IMAGE PAGE

W1 220
Nepean River
Source: <http://www.australiangeographic.com.au/photography/wallpapers/2014/02/nepean-river,-new-south-wales>
Photo: David Bristow, Australian Geographic

W2 221
Echo Point
Source: NSW Office of the Government Architect's Collection
Photo: Unknown

W3 223
Blue Mountains
Source: <http://www.aliviaggi.it/files/escursioni/img7/96.jpg>
Photo: Unknown

W4 223
Nepean Hawkesbury River
Source: <http://sydneyexcursions.blogspot.com.au/2011/07/nepean-river-walk-emu-plains-to-penrith.html>
Photo: sydneyexcursions.blogspot.com.au aka "Our Walks"

W5 223
Mount Tomah
Source: <http://www.johnnyjet.com/wp-content/uploads/2014/03/Sydney-to-Wolgan-Valley-Drive-Bilpin-March-2014-010.jpg>
Photo: JohnnyJet.com

W6 224
Wollemi National Park
Source: <http://www.exploreaustralia.net.au/images/content/rec/104/52230-1000x800.jpg>
Photo: Explore Australia Publishing

W7 228
Blue Mountains
Source: <http://www.aliviaggi.it/files/escursioni/img7/96.jpg>
Photo: Unknown

W8 228
Wentworth Falls
Source: <https://www.nationalparks.nsw.gov.au/~media/5C6B488958994F-D2AB5AAA9E6496B3D.ashx>
Photo: E Sheargold

W9 228
Nepean River
Source: <http://sydneyexcursions.blogspot.com.au/2011/07/nepean-river-walk-emu-plains-to-penrith.html>
Photo: sydneyexcursions.blogspot.com.au aka "Our Walks"

W10 230
Colo River
Source: http://ozultimate.com/tom/bush-walking/2008/20081206_colo-pass_6/photos.htm
Photo: Tom Brennan

W11 230
Wollemi National Park
Source: <http://www.exploreaustralia.net.au/blog/wp-content/uploads/2012/08/Wollemi-National-Park.jpg>
Photo: Evolving Images / Destination NSW

W12 230
Blue Mountains
Source: <http://www.lifesanadventure.com.au/wp-content/uploads/2016/05/Blue-Mountains-self-guided-walk-07.jpg>
Photo: Life's An Adventure

W13 231
Katoomba Civic Centre
Source: <http://www.mwarchitects.com.au/wp-content/uploads/2013/10/katoomba-civic-centre-01.jpg>
Photo: Geoff Ambler

W14 231
Penrith Station
Source: <http://www.penrithcitygazette.com.au/story/3227908/northern-cbd-set-to-boom-with-thornton-urban-living/>
Image: St. Hilliers and First Point

W15 231
Echo Point
Source: NSW Office of the Government Architect's Collection
Photo: Unknown

LIST OF FIGURES

W16 231 Jacaranda Park Source: http://www.pcal.nsw.gov.au/case_studies/glenmore_ridge/getting_there Photo: Department of Premier and Cabinet	W24 250 Warragamba Dam Source: http://www.thirdhorizon.com.au/joomla/index.php/about-us/news Photo: Third Horizon Consulting / © State of New South Wales through WaterNSW	W32 253 Nepean Creeks Source: http://geoassessment1byharrisonbinks.weebly.com/section-2---introduced-weeds.html Photo: Harrison Binks
W17 242 Penrith Lakes Aerial Source: http://www.groupdla.com.au/wp-content/uploads/2013/10/Penrith-Lakes-Aerial-Photo_1.jpg Photo: Group DLA / Department of Planning & Infrastructure	W25 250 Prospect Reservoir Source: http://cdn.newsapi.com.au/image/v1/5b45f410e765c6ea46b4e434f-990f531?width=650 Photo: Evan Sieff / Daily Telegraph	W33 253 Nepean River Source: http://gallery2.wildwalks.com/151334.jpg Photo: © Wildwalks
W18 246 Nepean River Source: http://gallery2.wildwalks.com/151334.jpg Photo: © Wildwalks	W26 252 Penrith Lakes Aerial Source: http://www.groupdla.com.au/wp-content/uploads/2013/10/Penrith-Lakes-Aerial-Photo_1.jpg Photo: Group DLA / Department of Planning & Infrastructure	W34 253 Shanes Park Woodland Source: http://www.shanespark.com/images/Shanes%20Park%20APS%20trip%20Apr2013%20(web).jpg Photo: Peter Ridgeway / Shane's Park Alliance
W19 247 South Creek Source: http://www.blacktown.nsw.gov.au/Environment/Water_Catchments/Catchments_Creeks_and_Wetlands/South_Creek Photo: Blacktown City Council	W27 252 Ropes Creek Source: http://architectureau.com/articles/2014-national-landscape-architecture-award-planning-wianamatta/#img=2 Photo: Environmental Partnership NSW	W35 253 Penrith Lakes Source: https://www.reddit.com/r/sydney/comments/31apbz/penrith_lakes_from_yellow_rock/ Photo: Reddit User "puppy2010"
W20 247 Warragamba Pipeline Source: http://www.watarnsw.com.au/_data/assets/image/0019/111637/varieties/banner_699x365.jpg Photo: © State of New South Wales through WaterNSW	W28 252 Cranebrook Nature Reserve Source: http://m0.i.pbase.com/o2/17/342117/1/134338550.7sZIVL3F.z5011507.jpg Photo: Paul Dudley	
W21 248 South Creek Source: http://www.blacktown.nsw.gov.au/Environment/Water_Catchments/Catchments_Creeks_and_Wetlands/South_Creek Photo: Blacktown City Council	W29 252 Great Western Highway Source: http://www.hboemtb.com/uploads/projects/_large_slide/Urban_Great-Western-Highway-Upgrade_Wentworth-Falls-East-(2).jpg Photo: HBO+EMTB	
W22 248 South Creek Source: http://www.blacktown.nsw.gov.au/Environment/Water_Catchments/Catchments_Creeks_and_Wetlands/South_Creek Photo: Blacktown City Council	W30 252 Great River Walk Source: http://www.kistudio.com.au/project/nepean-river-green-bridge/ Photo: KI Studio	
W23 250 Warragamba Pipeline Source: http://www.watarnsw.com.au/_data/assets/image/0019/111637/varieties/banner_699x365.jpg Photo: © State of New South Wales through WaterNSW	W31 252 Blaxland Creek Source: http://architectureau.com/articles/2014-national-landscape-architecture-award-planning-wianamatta/#img=3 Photo: Environmental Partnership	

FIGURE

Figure W.1: West District Open Space and Density Map
Figure W.2: West District LGA Plan
Figure W.3: West District Project Clusters Plan
Figure W.4: West District Access to Open Space Plan
Figure W.5: West District Hydrological Grid Plan
Figure W.6: West District Hydrological Grid Detail Plan
Figure W.7: West District Ecological Grid Plan
Figure W.8: West District Ecological Grid Detail Plan
Figure W.9: West District Recreational Grid Plan
Figure W.10: West District Recreational Grid Detail Plan
Figure W.11: West Green Grid Existing Values Plan
Figure W.12: West Green Grid Existing Values Detail Plan
Figure W.13: West Green Grid Project Opportunities
Figure W.14: West Green Grid Project Opportunities Detail
Figure W.15: West Preliminary Priority Projects Plan
Figure W.16: South Creek Potential Focus Areas
Figure W.17: South Creek Potential Important Cross Connections
Figure W.18: Warragamba Pipeline Potential Focus Areas

GIS DATASETS

NSW Department of Planning and Environment

Urban Renewal Priority Precincts and Priority Growth Areas (2017)
Land Release Priority Precincts and Priority Growth Areas (2017)
District Boundaries (2016)
Sydney Open Space (2016)
Metropolitan Rural Area (2016)
Regional Recreation Trails Framework (2012)
District Plan Centres (2016)

NSW Land and Property Information

Greater Sydney Local Government Areas (2016)
Railway Corridors (2016)
Metropolitan Motorways (2016)
Roads (2016)

NSW Office of Environment and Heritage

Ramsar Wetlands of NSW (2012)
Cumberland Subregion BIO Map Core Areas (2015)

Cumberland Subregion BIO Map Biodiversity Corridors of Regional Significance (2015)
Biobanking Sites (2016)
NSW National Parks and Wildlife Service (NPWS) Estate (2016)
Lands of High Environmental Value (HEV) (2016)
NSW Estuaries (2010)
Strahler Stream Order (2016)

NSW Transport

NSW Bicycle Geodatabase (2014)

Geosciences Australia

Metropolitan Hydro Areas (2011)
Metropolitan Seas (2011)
Sydney Water Supply Canals (2006)

Southern Sydney Regional Organisation of Councils

Connected Corridors for Biodiversity (2016)

