

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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SYDNEY GREEN GRID INTRODUCTION

THE SYDNEY GREEN GRID PROMOTES THE CREATION OF A NETWORK OF HIGH QUALITY OPEN SPACES THAT SUPPORTS RECREATION, BIODIVERSITY AND WATERWAY HEALTH. THE GREEN GRID WILL CREATE A NETWORK THAT CONNECTS STRATEGIC, DISTRICT AND LOCAL CENTRES, PUBLIC TRANSPORT HUBS, AND RESIDENTIAL AREAS.



A VISION FOR SYDNEY'S OPEN SPACE

Sydney's population is forecast to increase 80% by 2054. An additional three million people will live and work in metropolitan Sydney. As population density increases, our challenge is to shape the built environment so as to ensure that Sydney remains one of the world's most distinctive and liveable cities.

In acknowledging that green space is a key hallmark of liveability, The Sydney Green Grid proposes the creation and consolidation of a network of high-quality green areas that connect town centres, public transport networks and major residential areas. The Sydney Green Grid will make a vital contribution to the development of a liveable city by setting the framework for the enhancement of open space throughout Metropolitan Sydney.

Although Sydney has many green and water enriched spaces, what is missing – and this is the aim of this project – is an overarching schema that approaches them in a connected way, ensuring that their contribution to our quality of life, the environment and the economy are maximised, rendering a working-whole that is far greater than the sum of its parts.

The Sydney Green Grid in the context of "A Plan For Growing Sydney"

As Sydney grows, "A Plan for Growing Sydney" sets out a vision for Sydney to be a strong global city and a great place to live.

Sydney is one of the great cities of the world. The spectacular natural environment defines the city and contributes to our quality of life, health and wellbeing. Protecting the city's environment and ensuring economic and

social uses are sustainable will protect the attributes that make Sydney famous around the world and safeguard the city as a great place to live for future generations.

Urban renewal and priority growth areas are transforming many local communities through better transport, social infrastructure and public open space. As the Sydney metropolitan area faces increasing development pressure to meet new housing and employment targets, it becomes even more important to develop an adaptable open space network that improves the accessibility and quality of open space.

The integration of open space combined with quality urban design outcomes and environmental resilience at the metropolitan scale is both timely and vital during a period of considerable growth.

The Green Grid is a green infrastructure, design-led strategy that includes the full range of open spaces: from national, regional and local parks through the harbour, ocean beaches, wetlands, rivers and creeks, to playgrounds, playing fields, golf courses and cemeteries. Furthermore, interconnected linkages are fostered within the wider public realm through enhancing creek corridors, transport routes, suburban streets, footpaths and cycleways. The Green Grid is therefore an open-space interconnecting network that will keep the city cool, encourage healthy lifestyles, enhance biodiversity and ensure ecological resilience.

The Sydney Green Grid will provide hydrological, ecological and recreation services to the growing city, allowing sustainable growth. The grid will provide enhanced access to recreational open space, routes for walking and cycling, and opportunities for active and passive recreation. It will play a key role in the

management of water quality, treatment of stormwater and flood risk. It will protect and connect existing ecological communities and, improve the ability to adapt to and mitigate the impacts of heat, noise and air pollution while improving landscape and urban quality.

Sydney's District Plans

District Plans will build on the actions set out in *A Plan for Growing Sydney*. Councils, the community, the Greater Sydney Commission and the NSW Government will work together to finalise and implement these plans.

Greater Sydney has been divided into six districts as illustrated in Figure 1.2. This report has been prepared to inform the preparation of the District Plans for metropolitan Sydney.

This report supports the delivery of the Sydney Green Grid objectives by:

- Providing an overview and evidence-based understanding of open space types and distribution within each district.
- Establishing a vision and identifying strategic opportunities, linkages and key open space projects.
- Supporting the preparation of the District Growth and Infrastructure Plans
- Supporting and integrating local government planning initiatives and open space strategies
- Promoting opportunities for new partnerships between state and local government agencies, private development and private open space management in the delivery of key projects

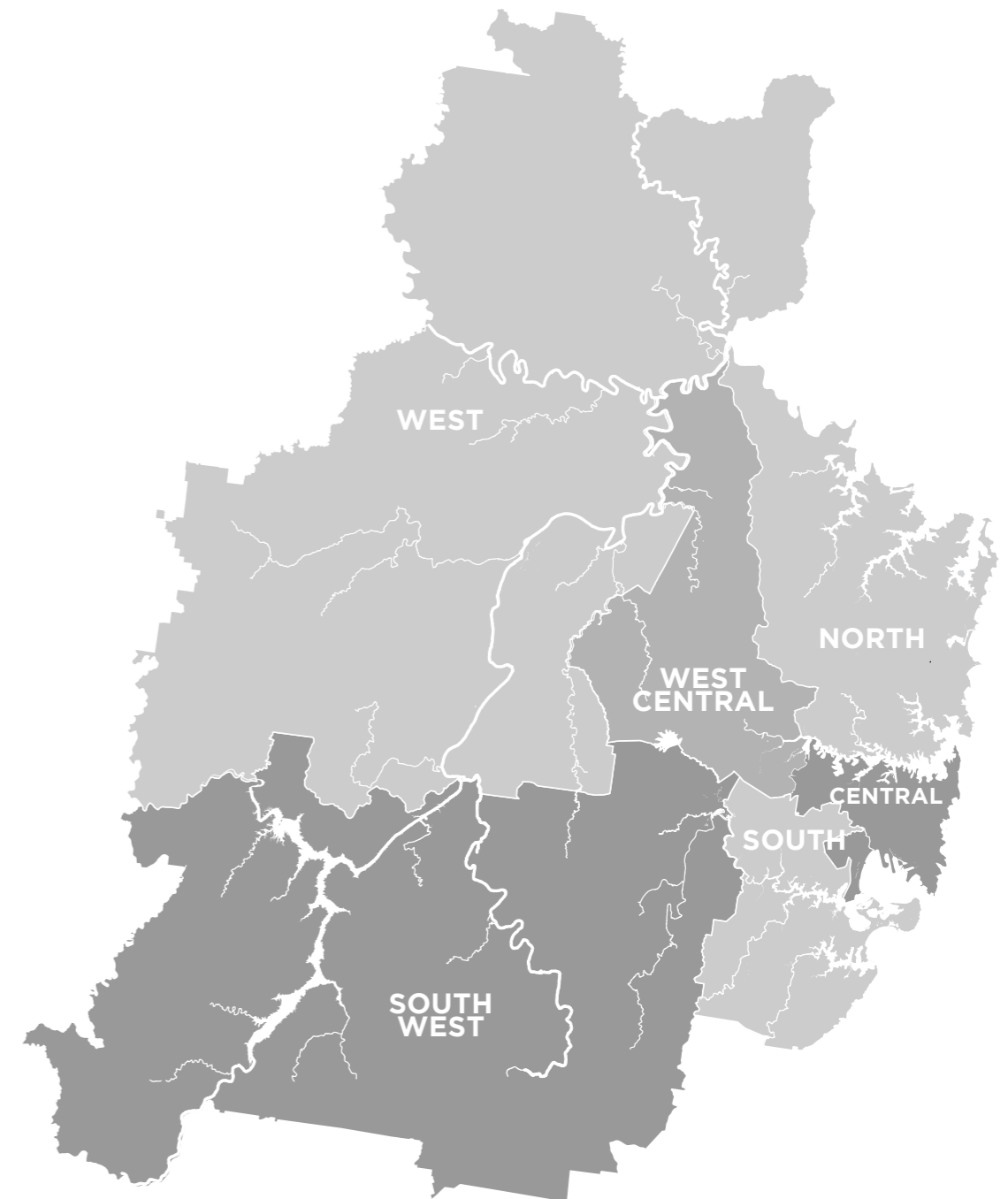


Figure 1.1: Sydney Metropolitan District

THE SYDNEY GREEN GRID PRINCIPLES

LIVABILITY WILL BE SYDNEY'S COMPETITIVE ADVANTAGE IN THE DECADES AHEAD. INTEGRATED WITH AREAS OF URBAN DEVELOPMENT, A HIGH QUALITY WELL MAINTAINED GREEN GRID WILL PROVIDE NEW LANDSCAPES FOR SYDNEY'S COMMUNITIES. IT WILL HELP PROMOTE HEALTHY LIVING AND COMMUNITY SPIRIT THROUGH ACCESS TO RECREATION AND CULTURAL OPPORTUNITIES WHILST ALSO PROMOTING BIODIVERSITY. THE PRINCIPLES BELOW ARE RELATED TO THE RECREATIONAL, ECOLOGICAL AND HYDROLOGICAL VALUES OF THE GREEN GRID.

[THE RECREATIONAL GRID]

INCREASE ACCESS TO OPEN SPACE

Improve connectivity to key regional destinations, foreshores, beaches and bays and continue to invest in the improvements of major parks and infrastructure.

Improve public domain and create new open space destinations as a benefit of key development and infrastructure projects.

Improve access to open space across major roads and infrastructure barriers.

Create new open space as a part of urban renewal, infill and infrastructure schemes and continue to invest in revitalising existing parks for the benefit of both the District and greater metropolitan Sydney.

Improve the diversity of recreation opportunities available throughout the Districts, with a particular focus in higher density areas.

ENCOURAGE SUSTAINABLE TRANSPORT CONNECTIONS AND PROMOTE ACTIVE LIVING

Promote and improve the pedestrian environment to increase the enjoyment of travelling on foot and by bike.

Encourage active and healthy living through improvements in the public domain that facilitate exercise and alternative modes of transport such as walking, cycling and jogging.

Align the open space network with longer term transport plans.

Protect priority green corridors and create a network of walking trails, cycle paths and open spaces along the river and creek corridors.

Enhance connectivity and legibility of recreational trails, particularly in and around high density precincts.

CREATE A HIGH QUALITY AND ACTIVE PUBLIC REALM

Create vibrant, multi-functional and enduring public spaces.

Provide a variety of dynamic spaces that are pedestrian-friendly, support street life and community activity and are places for social interaction and recreation.

Integrate key civic spaces or destinations with public transport opportunities and existing development.

[THE ECOLOGICAL GRID]

CONSERVE THE NATURAL ENVIRONMENT

Protect and enhance the natural resources and biodiversity of the Districts by improving the quality of watercourses, creating green habitat corridors and protecting endangered ecological communities.

Promote the wealth of social, cultural, recreational and educational opportunities within key natural, cultural and heritage landscapes.

Improve the ecological value of watercourses especially the heavily engineered concrete lined channels.

Restore and enhance wetland habitats and increase accessibility to them.

Promote social, cultural and recreational opportunities at key natural, cultural and heritage landscapes.

Create green corridors that provide habitat and biodiversity connections along major and minor watercourses.

ADAPT TO CLIMATE EXTREMES, IMPROVE AIR QUALITY AND INCREASE URBAN GREENING

Create resilient built environments through co-ordinated planning and design of greencover strategies including street trees, green walls and roofs, canopy trees, cool pavements and water sensitive urban design.

Promote greencover as integral to alleviating the effects of urban heat island effect while providing benefits such as improved amenity, comfort, health, reduced stormwater runoff, improved air and water quality and energy and resource efficiency.

Encourage the use of currently underutilised open space corridors for local community use as community gardens.

PROMOTE GREEN SKILLS, IMPROVE MANAGEMENT, MAINTENANCE AND SUSTAINABLE GREENSPACE DESIGN

Continue to invest in local, state and federal programs encouraging participation and skills training in environmental rehabilitation and open space, land management and maintenance.

Support the development of new and existing programs that enable voluntary community involvement in green initiatives including bush regeneration and community gardens.

Develop local council policies to encourage local food production as a recreational opportunity for local communities.

Support the Federal Governments 'Green Army Programme' to rehabilitate riparian bushland and improve water quality while allowing participants to work towards Conservation Land Management qualifications.

[THE HYDROLOGICAL GRID]

UTILISE THE NETWORK QUALITY OF THE HYDROLOGICAL SYSTEM

The Blue Grid offers an opportunity to use Sydney's water systems as an interconnected network. Connecting public open space and active transport and pathway systems along waterways creates a complex and connected layer of the Green Grid. Making multi-use of land adjacent to waterways for water treatment, protection of ecological communities, open space and recreation.

INCREASE ENVIRONMENTAL QUALITY

Improve the water and ecological quality of waterways along the entirety of the hydrological system. Approaches including Water Sensitive Urban Design (WSUD), daylighting of waterways and stormwater reuse will take a soft infrastructural approach and aid in a city wide water quality improvement while also reducing ongoing hard infrastructure requirements.

REDUCE INFRASTRUCTURE RISK

Successful management of water systems are critical to the ongoing function of the city. As a growing city, Sydney needs a resilient waterway network that successfully manages flood risks, reduces peak flows and maximises infrastructural resilience in the face of rapid population growth and environmental change.

REVEAL THE UNIQUE CHARACTER OF SYDNEY'S WATERSCAPES

Enhance the particular character of Sydney's waterways to define the landscape character and urban structure of the districts of the city. Sydney can be defined as having four major waterway systems:

1. Coastal edges and lagoons
2. Harbour Bays and the estuarine rivers
3. Filigree of Creeks and the undulating Cumberland Plain
4. Dams, Gorges and Deep river valleys

A planning and urban design approach that is responsive to these systems will help to connect people to a sense of place specific to their location in Sydney.

REFRAME WATERWAYS AS CONNECTORS NOT BARRIERS

Waterways have often become edges to development that become barriers between communities. The Blue Grid offers the opportunity to use waterways as central to defining the urban structure of the city and to become the glue that binds communities together.

[THE AGRICULTURAL GRID]

The Values of the Metropolitan Rural Area of the Greater Sydney Region Report will form an important part of the Green Grid, particularly in Sydney's west.

Please refer to the report titled: Considerations for District Planning in the Values of the Metropolitan Rural Area of the Greater Sydney Region for detailed discussion regarding rural land and their values.

COMPOSITION OF THE GREEN GRID

THE SYDNEY GREEN GRID IS A NETWORK THAT SEEKS TO COMBINE HYDROLOGICAL, ECOLOGICAL AND URBAN RESILIENCE THROUGH A NETWORK OF GREEN INFRASTRUCTURE.

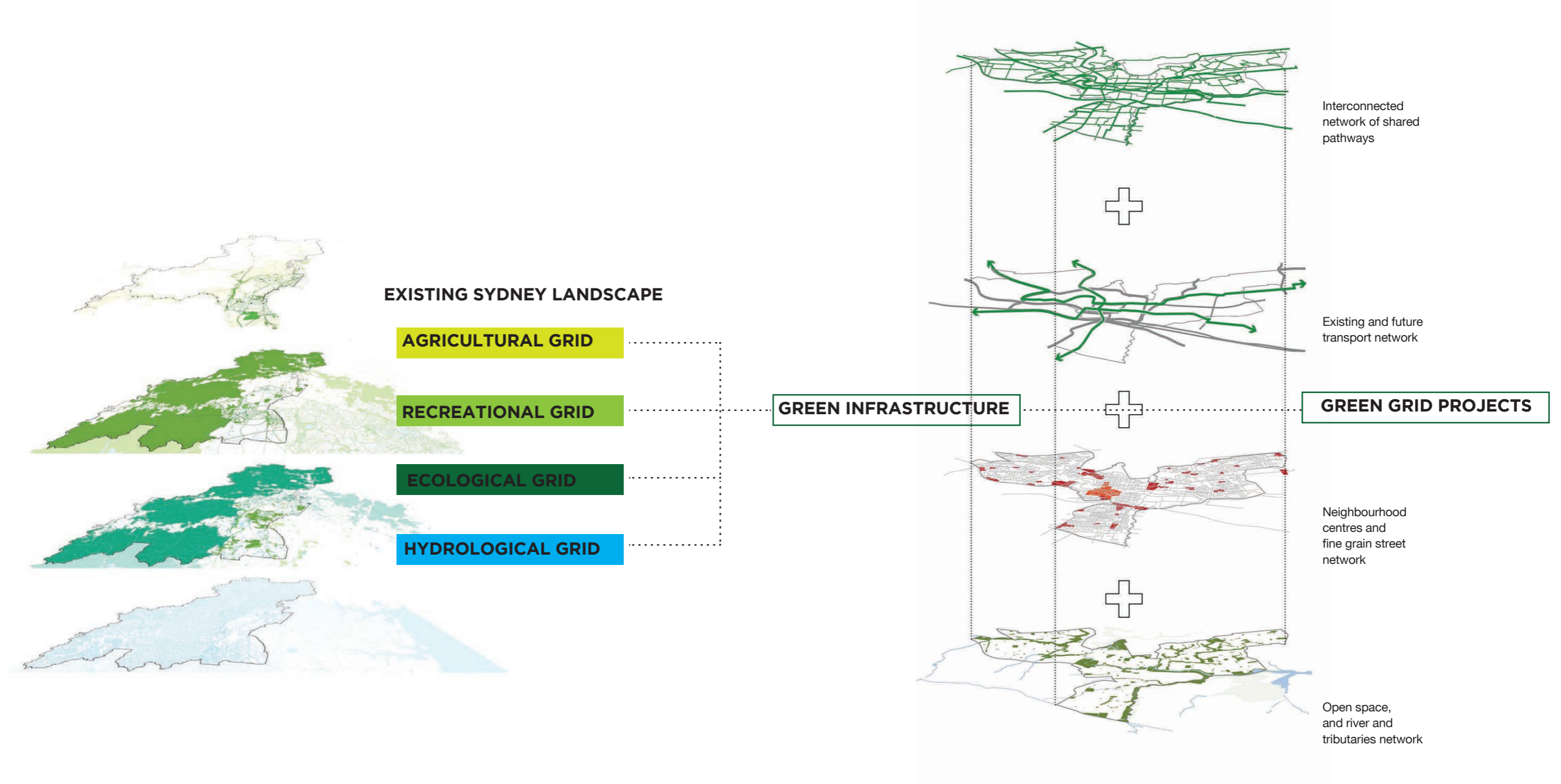


Figure 1.2: Layers of the Sydney Green Grid

The development of Sydney as a cultural landscape has been ongoing for over 40,000 years. The landscape has been formed and influenced by a series of different systems, including hydrological, ecological, and cultural systems.

The Sydney Green Grid is composed of a combination of four of the fundamental landscape layers [or grids] which underpin the geographic and urban structure of Sydney.

They are:

- **The Hydrological Grid** including natural and man-made manipulated water systems of the city.
- **The Ecological Grid**, including geomorphology, biodiversity, ecological communities.
- **The Recreational Grid**, including open space provision for active and passive recreation, walking and cycling networks, urban open space, public domain and streetscapes.
- **The Agricultural Grid** including rural and peri-urban landscapes, food and productive landscapes as well as those with scenic rural landscape values.

The grid layers are inter-related but historically have been separated for the purposes of efficient governance of city infrastructure. In this report the hydrological, recreational and ecological fragments of the city are mapped and then pulled together into a cohesive green infrastructure network.

From the green infrastructure network, projects identified as “catalyst projects” are selected based on their priority in the network. Projects are prioritised based on their overlap or proximity to other development patterns. These projects are identified based on the project prioritisation matrix.

Catalyst projects are identified through their overlap with current transport, utilities, or development plans. Catalyst projects can be split into two types of projects:

- Small Projects that are missing links between existing Green Grid links.
- Large Projects that have transformational potential at a district or super-district scale and have the potential influence future development and transport strategies.

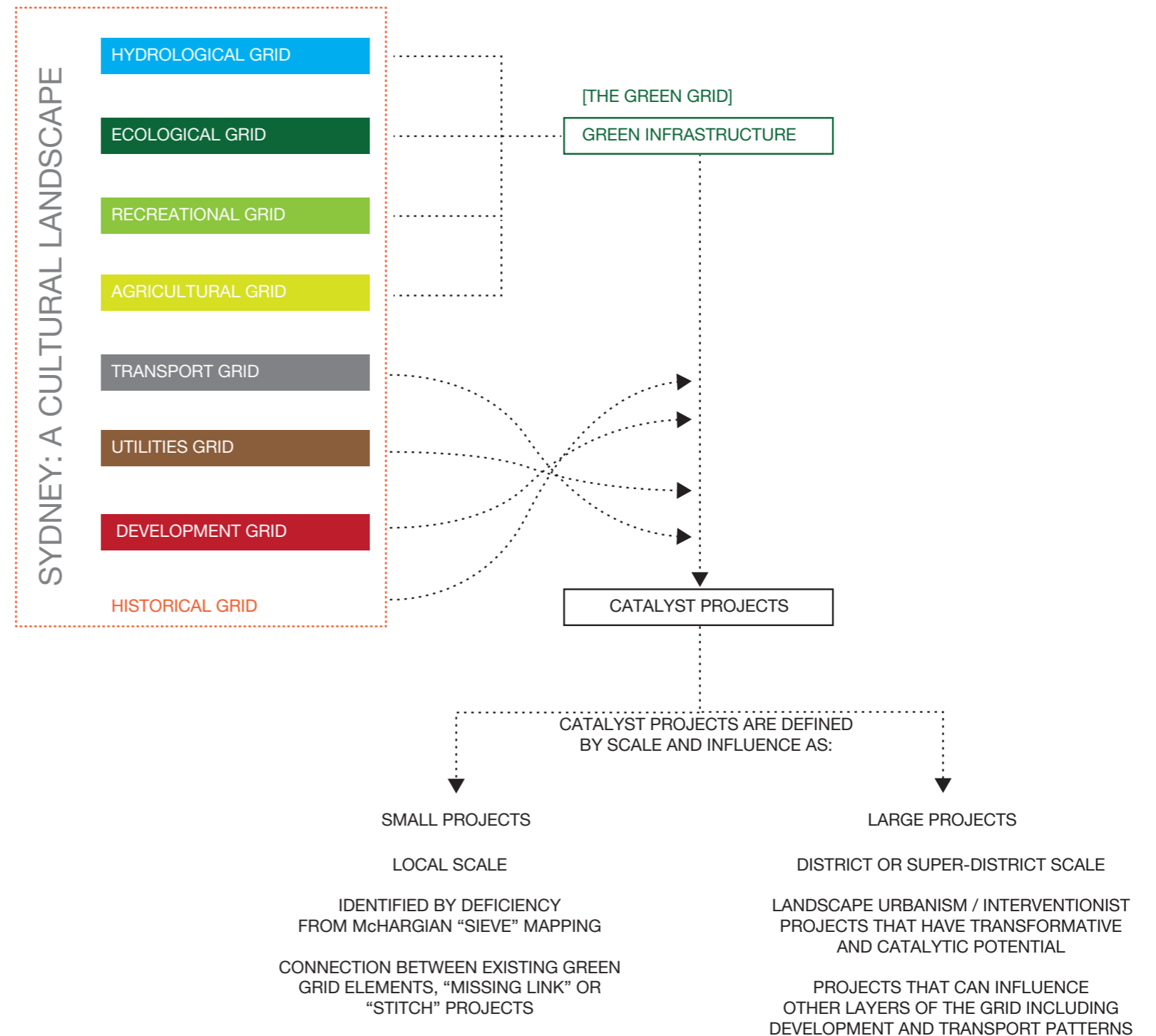


Figure 1.3: The Sydney Green Grid Catalyst Projects

A PLACE SPECIFIC APPROACH TO DISTRICT PLANNING

PROPOSING, CLASSIFYING AND PRIORITISING PROJECT OPPORTUNITIES

The purpose of this report to collect proposed open space projects, classify them according to their performative qualities and prioritise projects based on their performance potential and overlap with current urban development needs and priorities.

A series of workshops held by the Greater Sydney Commission (GSC) and including state and local agencies and stakeholders identified current, potential and speculative projects and issues relating to environment, open space and active transport planning issues in each of

Sydney's Districts. Additionally, project opportunities were identified through interrogation and analysis of GIS mapping of high value land in hydrological, ecological and/or recreational layers. All project opportunities identified through GIS mapping, GSC workshops and stakeholders were compiled into a project list for prioritisation and classified in accordance with their dominant performative qualities.

From this list, projects were categorised into two strands for future open space planning in Sydney. Firstly, Green Grid

projects that protect high value lands (the "protectionist strategy") as long-term planning for future urban development. Secondly, projects that align with Sydney's current development priorities (the "projectionist strategy"). The overlap or proximity of Green Grid projects with development growth or priority precincts, strategic lands or open space needs in areas of deficiency or disadvantage. It is from these projectionist projects that the highest priority projects were identified.

Preliminary prioritisation of project opportunities was provided in terms of

their performance as catalysts for the establishment of a new interconnected high performance green infrastructure network which supports urban growth in greater Sydney. Prioritisation of projects focussed on both their environmental and recreational performance potential and their location in proximity to future development plans, strategic lands, complimentary infrastructural projects or local government priorities.

A one size fits all approach to open space provision, landscape and infrastructure for the city is not adequate in dealing with

the different needs of living in the various communities across the city.

The Green Grid methodology therefore seeks to identify and create an open space planning approach that is site specific and responds to local character and needs.

Making use of the landscape character features in each district of the city will, along with a range of other measures, ensure Sydney becomes a more equitable and liveable city, but also a city which evolves with a genuine sense of place woven throughout its six districts.

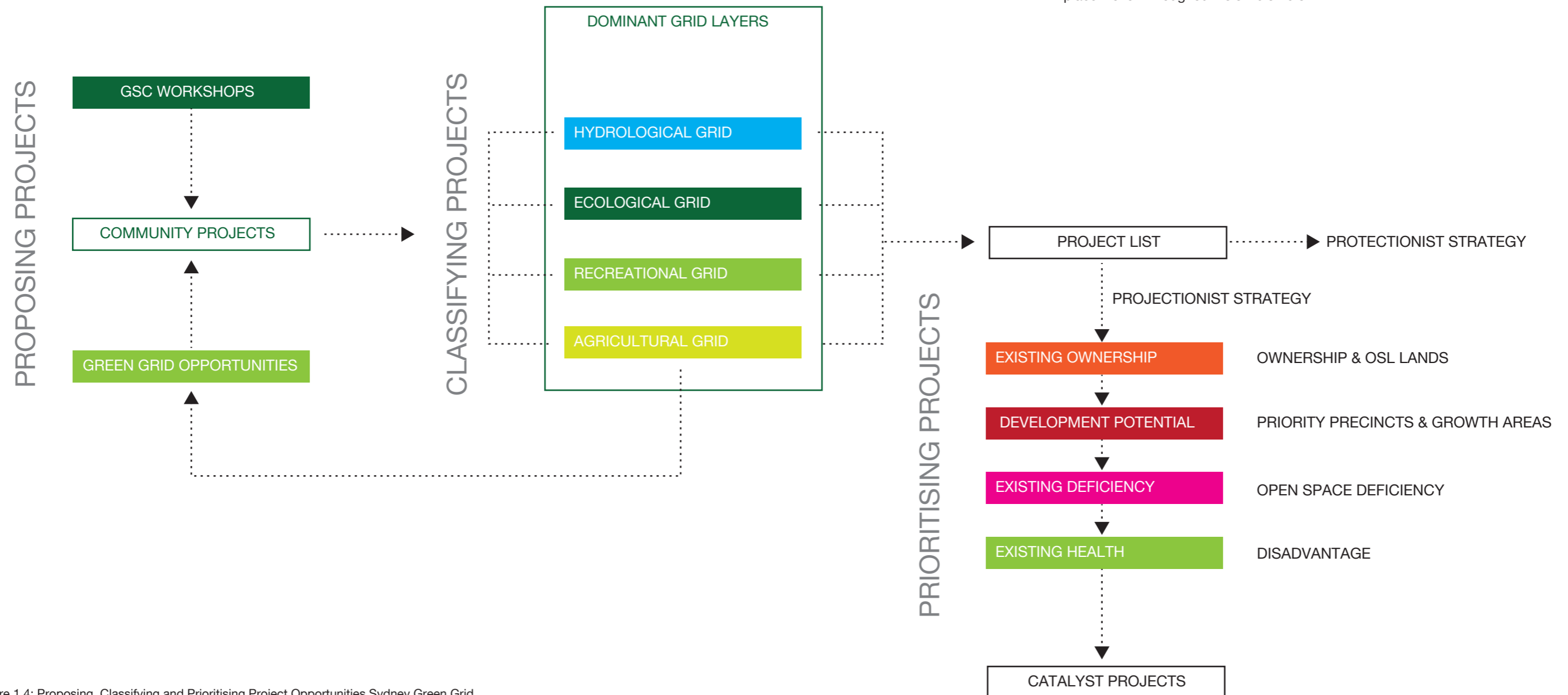


Figure 1.4: Proposing, Classifying and Prioritising Project Opportunities Sydney Green Grid

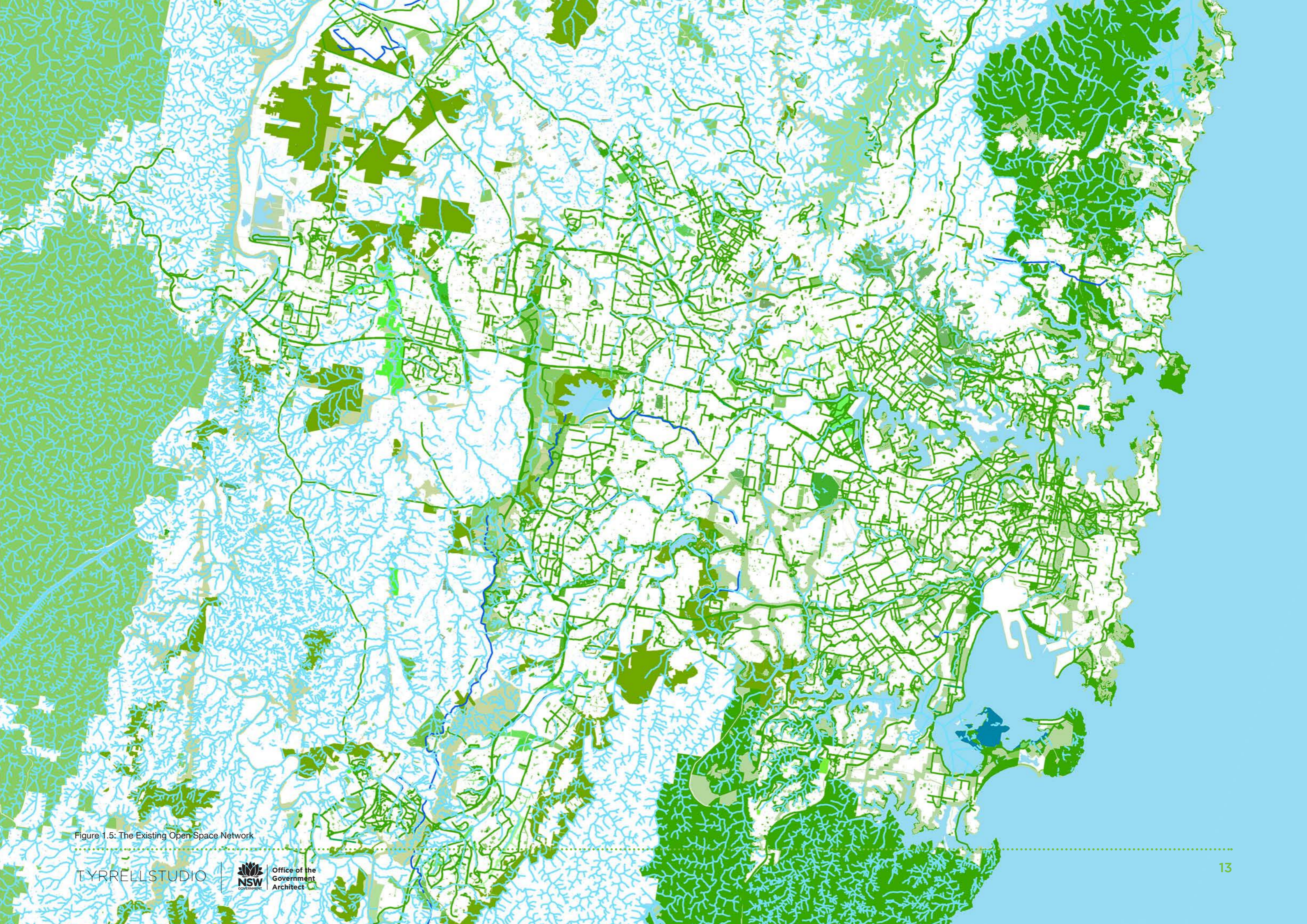


Figure 1.5: The Existing Open Space Network

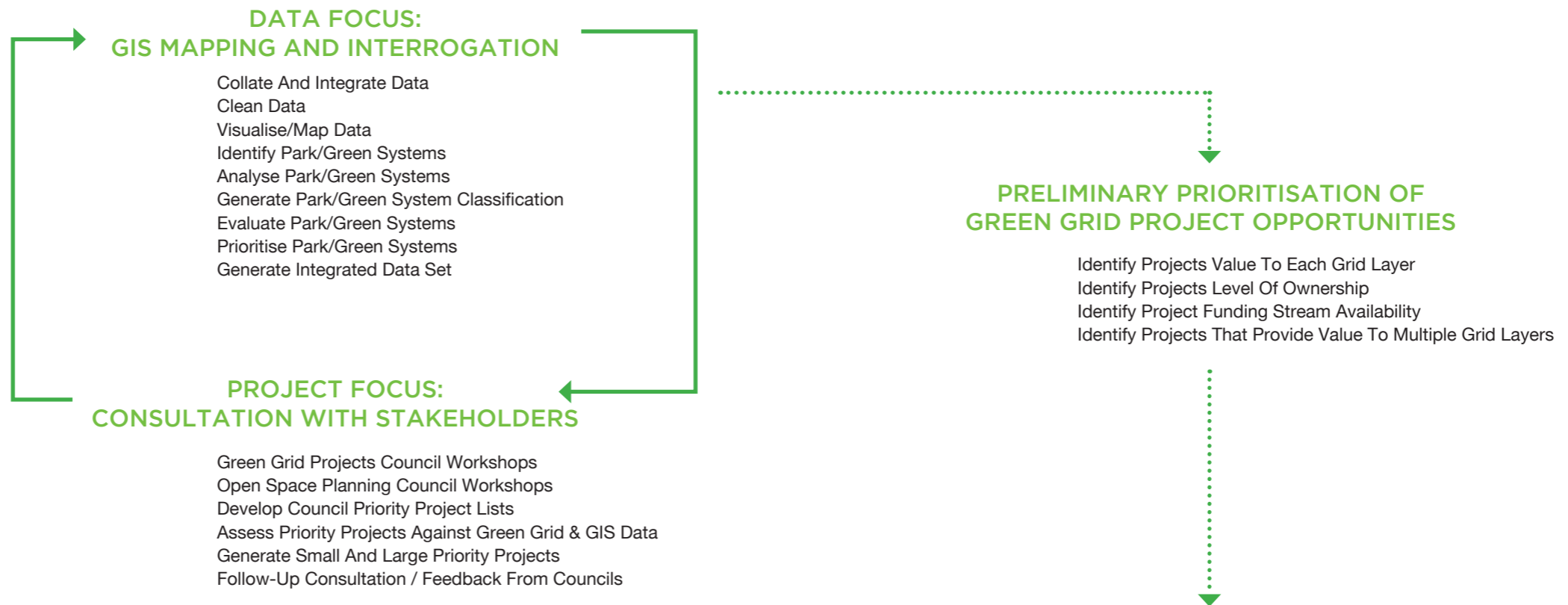
PROJECT METHODOLOGY

ANALYSING THE NETWORK AND IDENTIFYING THE GREEN GRID PROJECT OPPORTUNITIES

The Green Grid network will be analysed through the grid layers and project opportunities will be identified and prioritised based on two values:

1. Their value to the grid layers identified through interrogating the GIS Data and/or
2. Their value to stakeholders, project ownership held by government, councils or community groups.

This way project opportunities can be identified from either a “Data Focus” (GIS Mapping and overlays of important geographical features) or “Project Focus” (Projects identified in workshops or previous plans or strategies). Identified projects will then be compared and prioritisation will be determined based on projects relative significance to grid layers, community support, funding and land ownership opportunities, project overlaps and multi-grid values.



DATA FOCUS: GIS MAPPING AND INTERROGATION

- Collate And Integrate Data
- Clean Data
- Visualise/Map Data
- Identify Park/Green Systems
- Analyse Park/Green Systems
- Generate Park/Green System Classification
- Evaluate Park/Green Systems
- Prioritise Park/Green Systems
- Generate Integrated Data Set

PROJECT FOCUS: CONSULTATION WITH STAKEHOLDERS

- Green Grid Projects Council Workshops
- Open Space Planning Council Workshops
- Develop Council Priority Project Lists
- Assess Priority Projects Against Green Grid & GIS Data
- Generate Small And Large Priority Projects
- Follow-Up Consultation / Feedback From Councils

PRELIMINARY PRIORITISATION OF GREEN GRID PROJECT OPPORTUNITIES

- Identify Projects Value To Each Grid Layer
- Identify Projects Level Of Ownership
- Identify Project Funding Stream Availability
- Identify Projects That Provide Value To Multiple Grid Layers

TO OBTAIN PRIORITY A GREEN GRID PROJECT OPPORTUNITY MUST EXHIBIT THREE THINGS:

- | | | |
|---|---|--|
| <p>1. PERFORMANCE</p> <p>Projects must be of high value to at least one grid layer. High value in multiple grid layers is preferred.</p> | <p>2. OWNERSHIP</p> <p>Interest groups, councils or government agencies must have ownership over projects or aspects of a project for it to become a priority.</p> | <p>3. FUNDING</p> <p>Funding streams must be available for projects. This may be from a single stream or a collection of streams.</p> |
|---|---|--|

PROJECT METHODOLOGY

The process of designing and identifying Green Grid projects needs a methodical work-flow that ensures all compiled GIS Data is understood and gaps are acknowledged.

To the right is our schematic overview of our study design, highlighting the challenges of identifying relevant data, generating necessary spatial procedures for linking and generating the green grid and for selecting and initiating major projects that make up the green grid.

Green dotted boxes indicate the major steps within the work flow path. The three lime green boxes indicate the three types of work streams within the process.

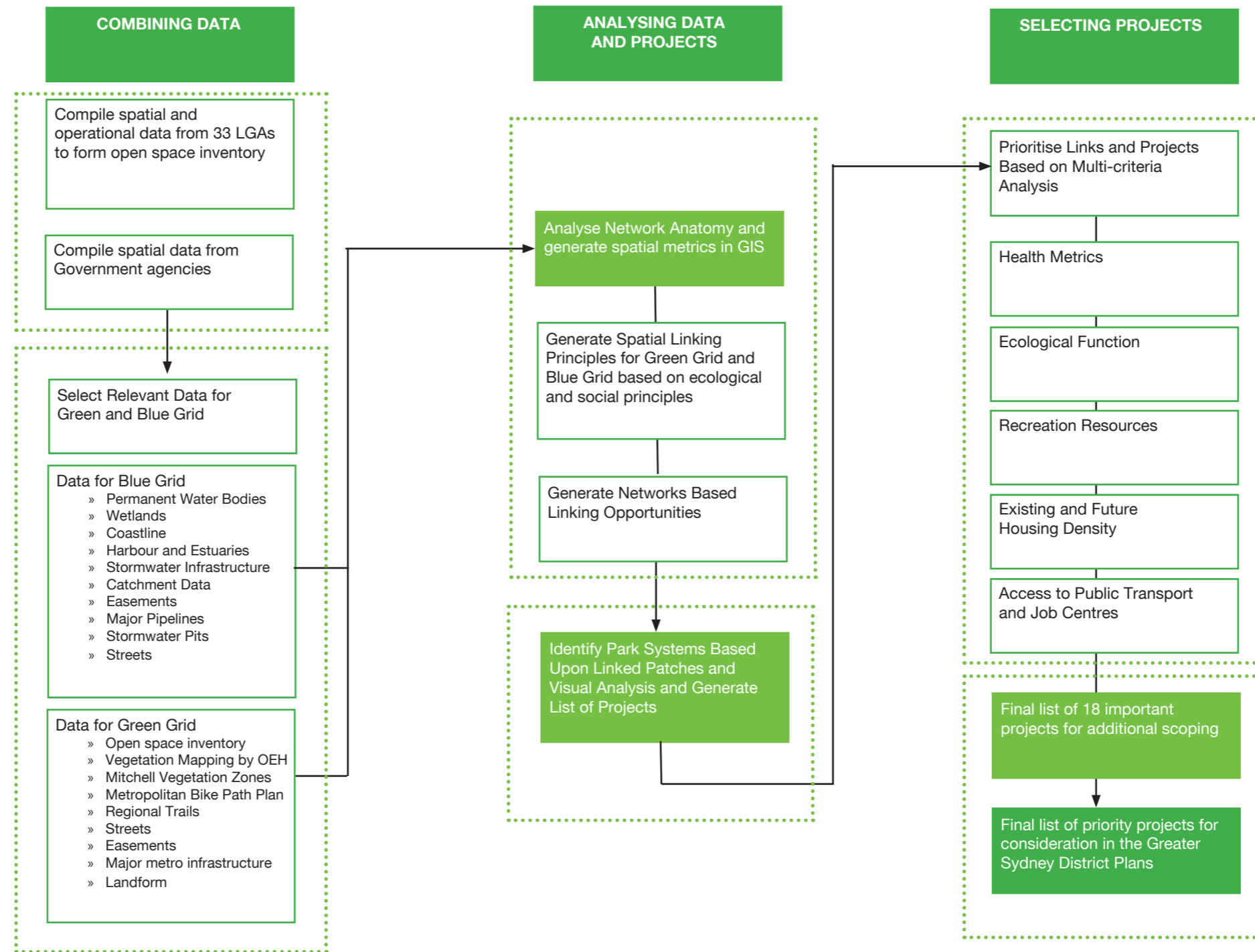


Figure 1.6: Project Methodology

SYDNEY GREEN GRID SPATIAL FRAMEWORK

HYDROLOGICAL GRID

TAKING STOCK OF SYDNEY'S GREEN GRID OPPORTUNITIES

The hydrological system of Sydney is complex and interconnected with ecological, development and historical patterns of the city. Some typologies of the hydrological grid can be categorised as follows:

1. Harbour and Ocean Landscape

- > Large, deep and wide harbour bays
- > Coastal lakes and lagoons
- > Coastal beaches
- > Harbour beaches
- > Steep banked northern harbour rivers
- > Flat southern harbour bays

2. Brackish River Landscapes

- > Estuary Landscapes
- > Network of subsidiary creeks
- > Region of transition from salt to fresh water rivers
- > Region of transition from steep to flat river edges






3. Filigree of Creeks and Undulating Cumberland Plain

- > Many small, parallel creeks
- > Very long creeks running across the Cumberland Plain
- > An intricate hierarchy of small creeks
- > Undulating landscape and large floodplains

4. Gorges, Dams and Deep River Valleys

- > Deep, steep river valleys
- > On the periphery of the Sydney Basin including the Blue Mountains, Hornsby and Ku-Ring-Gai, and Woronora Plateaus
- > Locations of major drinking water infrastructure servicing Sydney.

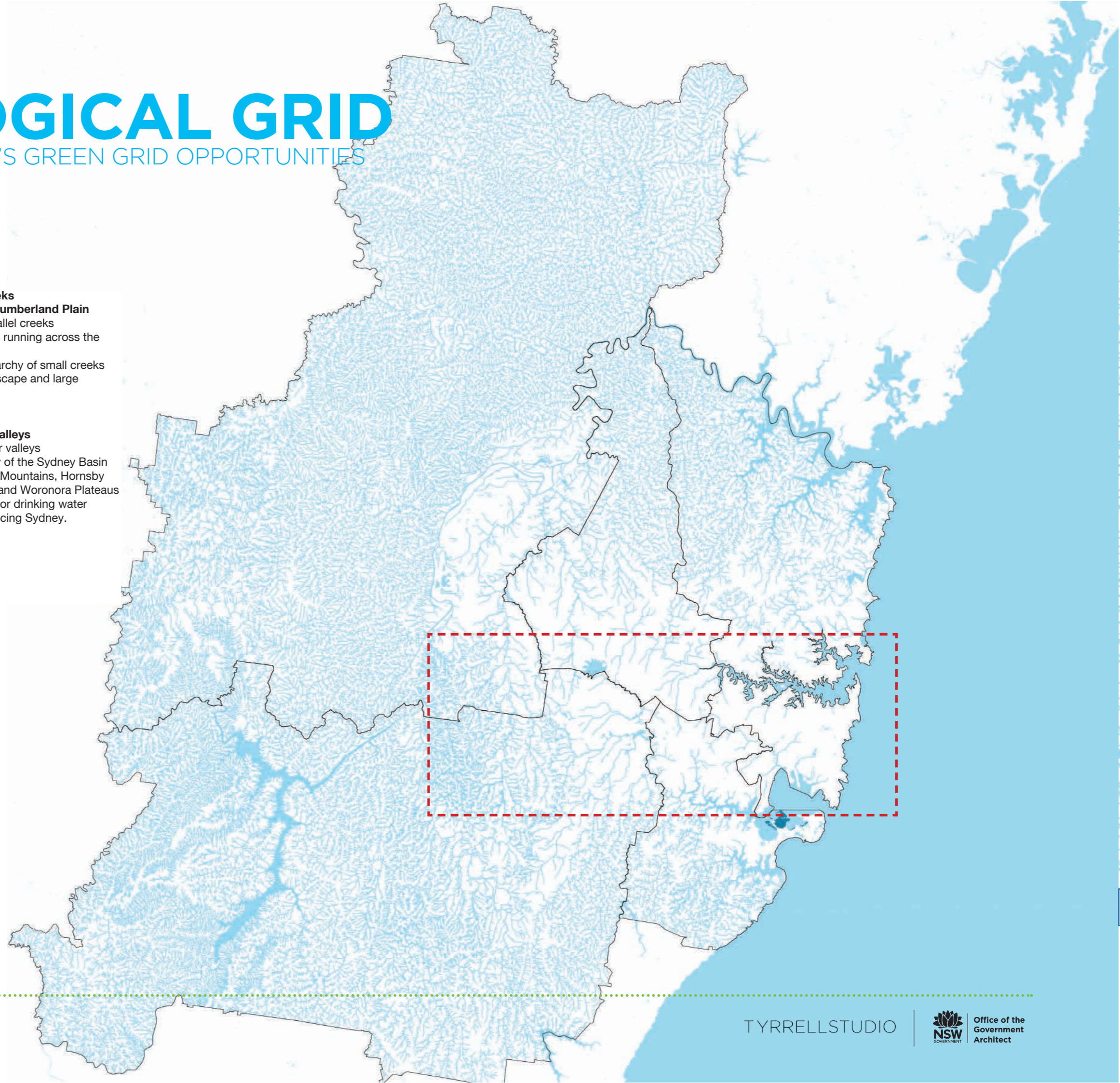
LEGEND

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

SCALE 1:250,000 @ A1

0 2.5 5 7.5 10 12.5km

Figure 1.7: The Hydrological Grid



THE SHIFTING MOSAIC OF HYDROLOGICAL CHARACTER

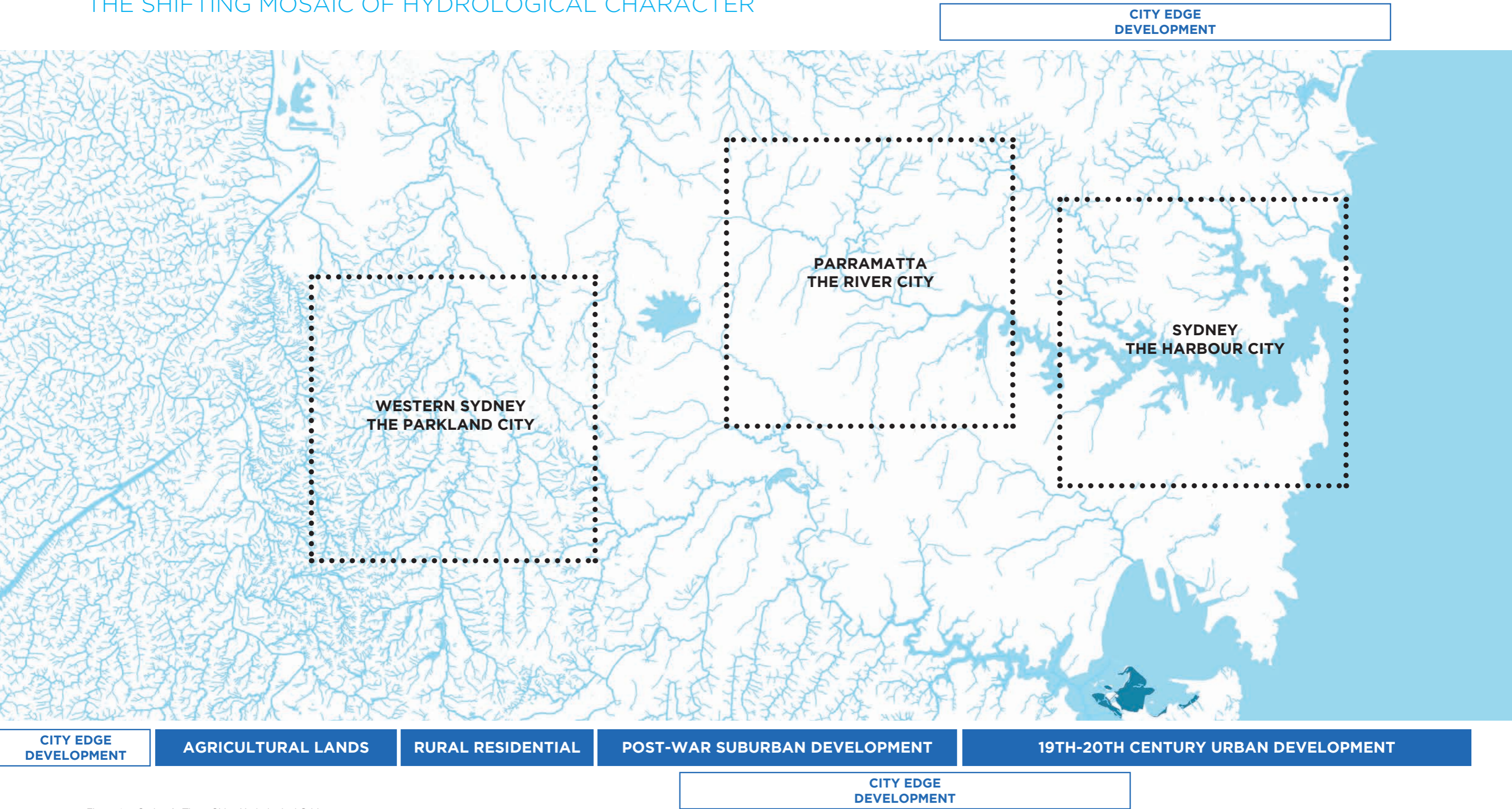
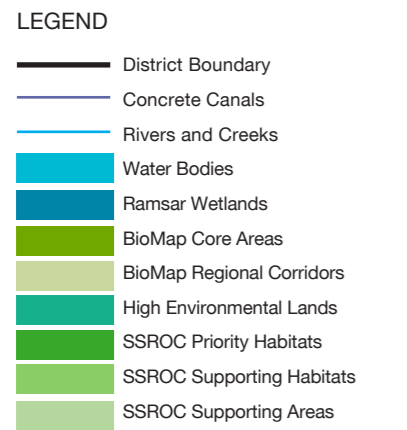


Figure 1.8: Sydney's Three Cities Hydrological Grid

ECOLOGICAL GRID

TAKING STOCK OF SYDNEY'S GREEN GRID OPPORTUNITIES



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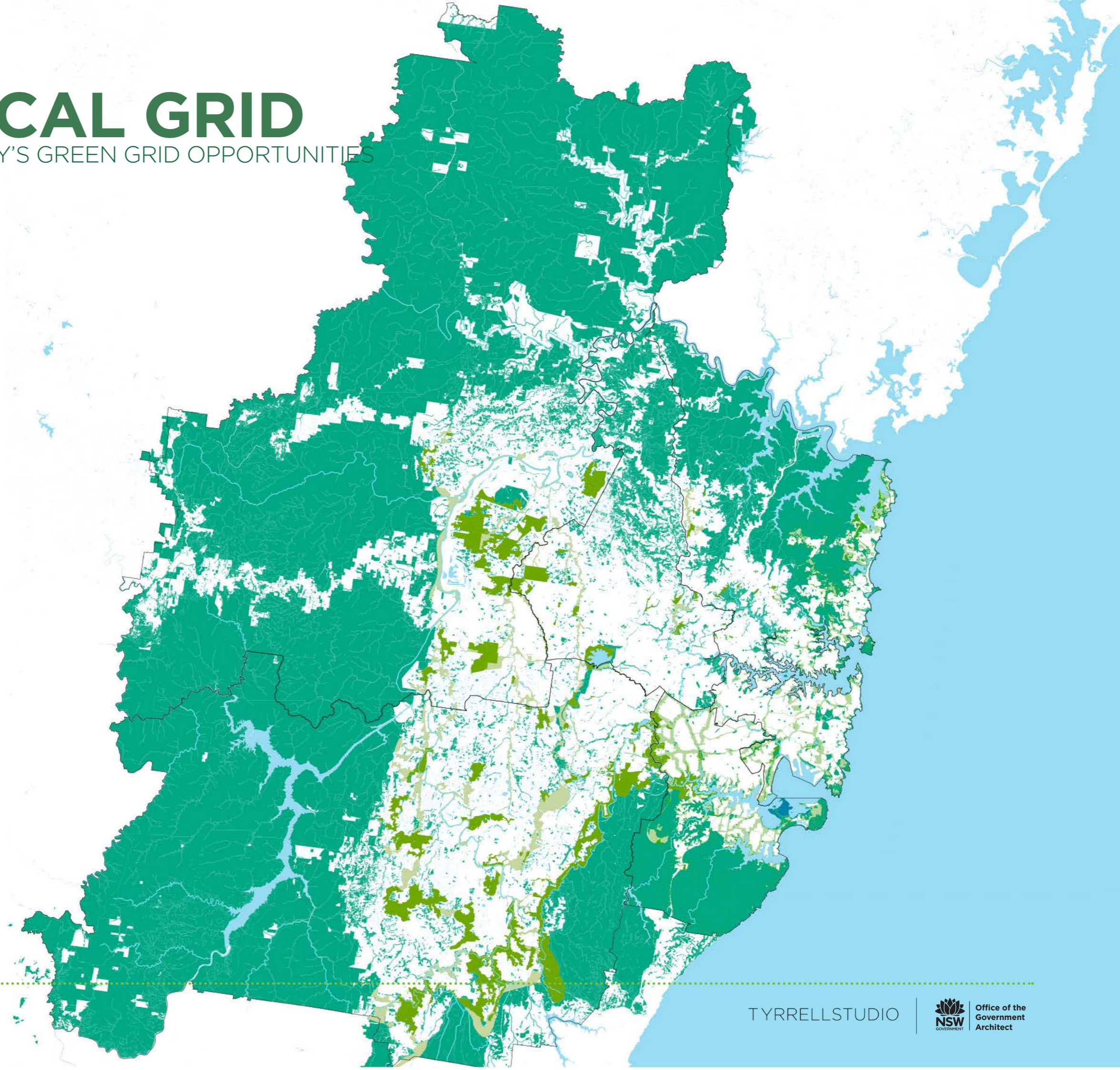


Figure 1.9: The Ecological Grid

RECREATIONAL GRID

TAKING STOCK OF SYDNEY'S GREEN GRID OPPORTUNITIES

LEGEND

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

SCALE 1:250,000 @ A1

0 2.5 5 7.5 10 12.5km

Figure 1.10: The Recreational Grid

COMBINED GRID VALUES

TAKING STOCK OF SYDNEY'S GREEN GRID COMBINED EXISTING OPPORTUNITIES















This plan shows the existing landscape mosaic of the Sydney region, and is a combination of the hydrological, ecological and recreational grids shown on the previous pages.

The plans in this report have been generated in order to map and analyse the landscape structure across the 6 districts of Sydney. The landscape structure has been fragmented over time as the city has urbanised. The layers for each district have been split into grids in order to examine each potential project with clarity.

Green Grid projects seek to pull the fragmented landscape systems of the city back together into a highly connected green infrastructure framework which underpins future urban development.

For each district, projects have been identified through analysis of the district combined with local council workshops. Projects are prioritised based upon their potential to establish a high performance green infrastructure network.

LEGEND

-  District Boundary
-  Concrete Canals
-  Rivers and Creeks
-  Water Bodies
-  Ramsar Wetlands
-  BioMap Core Areas
-  BioMap Regional Corridors
-  High Environmental Lands
-  SSROC Priority Habitats
-  SSROC Supporting Habitats
-  SSROC Supporting Areas
-  Public Open Space
-  Cycleways Existing
-  Cycleways Proposed

SCALE 1:250,000 @ A1

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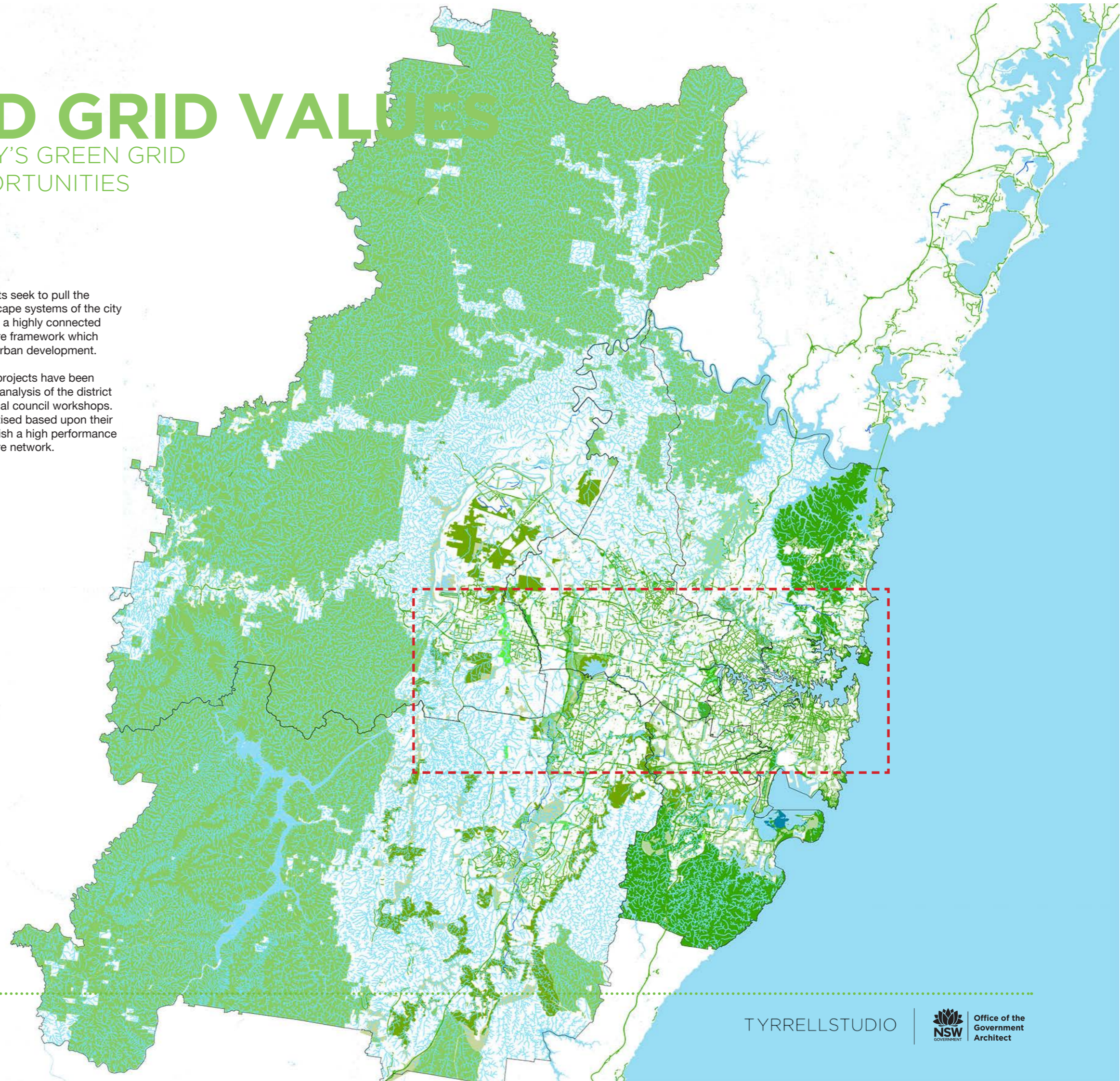
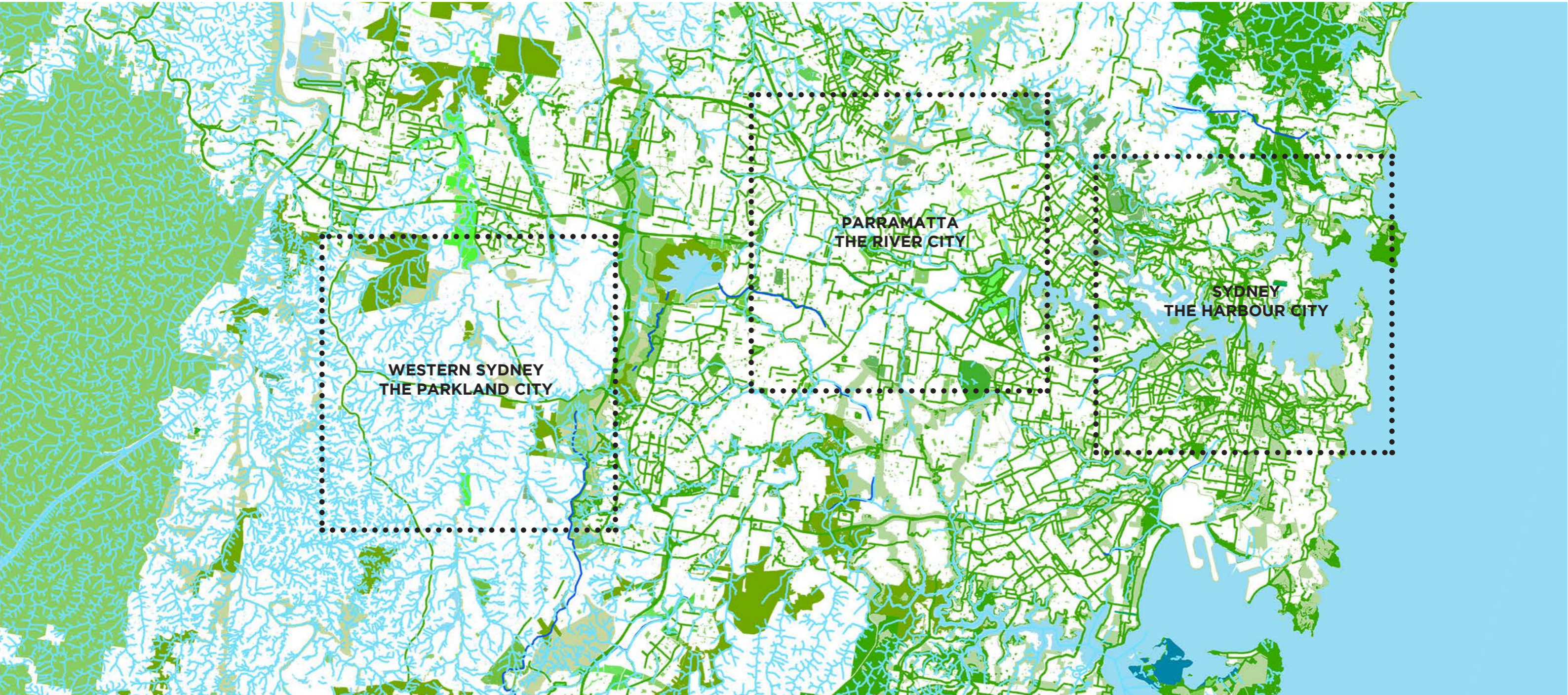


Figure 1.11: Sydney Green Grid: Combined Grid Opportunities

THE SHIFTING MOSAIC OF SYDNEY'S CHARACTER

NATIONAL PARKS AND CITY EDGE DEVELOPMENT



CITY EDGE DEVELOPMENT

AGRICULTURAL LANDS

RURAL RESIDENTIAL

POST-WAR SUBURBAN DEVELOPMENT

19TH-20TH CENTURY URBAN DEVELOPMENT

NATIONAL PARKS AND CITY EDGE DEVELOPMENT

Figure 1.12: Sydney's Three Cities: Combined Grid Opportunities

THE EMERGING CITY: THE THREE CITIES OF SYDNEY

Our metropolitan mapping of Sydney shows the varying characteristics of the Green Grid across the Sydney landscape. A complex interplay between hydrological systems, ecological protection, open space planning history and development patterns mean that the Green Grid is required to take different forms that are locally responsive to the landscape and development history across Sydney.

This presents a unique opportunity for urban planning of Western Sydney as it sits on the cusp of major infrastructural investment and population growth. Western Sydney Airport, The South West Growth Area, motorway, rail and light rail infrastructure investment combined will have a major transformative effect on Western Sydney.

Analysing the open space and environmental values of Western Sydney presents the Green Grid as an opportunity to develop a citywide vision for infrastructure provision that sees transport, utilities, development and green infrastructure as interdependent and of equal importance in developing an equitable, liveable and resilient city.



THE PARKLAND CITY FEATURES:

- > A filigree of Creeks and small waterways
- > Landscape of small dams and local catchments
- > A north-south creek structure bound by the Blue Mountains escarpment and the ridge of the Georges and Parramatta River catchments.
- > Remnant ecological patches and corridors
- > Western Sydney Parklands and other remnants of former green belt planning.
- > An undulating hill landscape and flatter Cumberland Plains
- > Rural landscape character still intact.
- > Borrowed views of the Blue Mountains and Southern Highlands.

THE PARKLAND CITY [WESTERN SYDNEY]





THE RIVER CITY FEATURES:

- > A river landscape characterised by the Parramatta and Georges Rivers.
- > A semi-intact creek network, often transformed into concrete channels.
- > Development patterns that have left some fragments of open space corridors alongside river edges.
- > A development focus in centres along the rivers.
- > Some bands of connected open space, lost space along other infrastructure and remnant ecological patches.



THE HARBOUR CITY FEATURES:

- > A deep and protected harbour landscape, with ocean and harbour beaches.
- > Northern harbour rivers with very steep banks, often with large corridors of open space
- > Southern harbour bays with concrete channelised creek systems.
- > Pattern of development focus along ridge lines with open space in low lying lands.
- > Very few connected open space corridors within development and small remnant ecological patches only.

THE RIVER CITY [PARRAMATTA]

THE HARBOUR CITY [SYDNEY]



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

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GIS DATA SETS

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