Identifying priority investment areas

Supplementary information to the
Draft Biodiversity Conservation
Investment Strategy 2017–2037

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ISBN 978 1 76039 920 7
OEH 2017/0511
November 2017

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1. Purpose of paper

This paper provides supplementary information on the approach to identifying priority investment areas in section 2.3 of the *Draft Biodiversity Conservation Investment Strategy 2017-2037*. It includes information about how the principles for identifying these areas have been applied, including the state-wide data sets used. Maps of each input layer are provided as well as information and mapping about New South Wales progress to national 'comprehensiveness' and 'representativeness' targets. At the end of the paper, the priority investment areas are listed and mapped in five orders of priority.

2. Principles for identifying priority investment areas

The strategy identifies a set of principles to guide the identification of priority investment areas (section 2.3.2). These principles are summarised in Table 1.

Table 1 Principles for identifying priority investment areas

1	**Areas of high environmental value should be prioritised**	Ensures that priority investment areas focus on areas of high environmental value, including core areas of remnant vegetation and good samples of the least protected ecosystems
2	Areas that improve ecological connectivity and resilience to climate change should be prioritised	Prioritises areas that may form corridors connecting core areas of remnant vegetation to support animal and plant populations that may otherwise be isolated and at greater risk of extinction
3	Areas that contribute most towards a comprehensive, adequate and representative (CAR) protected area system should be prioritised	Ensures priority investment areas include the least protected ecosystems and areas that will contribute to building a CAR protected system
4	Areas where high environmental value assets are under the greatest threat should be prioritised	Prioritises areas in New South Wales where conservation assets are likely to be subject to significant pressure from agricultural clearing or incremental loss and may therefore benefit most immediately from protection and investment.

3. Identifying high priority NSW Landscapes

The four prioritisation principles have been applied using appropriate state-wide data sets to identify high priority NSW Landscapes across New South Wales. These data sets are summarised in Table 2 and explained in detail in the following sections. For each data set, scores have been applied to all NSW Landscapes to allow landscapes to be prioritised and depicted on a map. These four data sets are then collated to produce a state-wide map of priority NSW Landscapes (see Figure 5).

Table 2 Principles and data for identifying high priority NSW Landscapes

Principle	Data used
Principle 1: Areas of high environmental value should be prioritised	Subset of 'High Environmental Value' mapping provided by Office of Environment and Heritage to the Department of Planning and the Environment to support Regional Plans.
Principle 2: Areas that improve ecological connectivity and resilience to climate change should be prioritised	Extent of native vegetation • NSW Landscapes iar.environment.nsw.gov.au/dataset/nsw-mitchell-landscapes-version-3-1 • Over-cleared landscapes database www.environment.nsw.gov.au/resources/bionet/150022-quick-guide-overcleared-landscapes.pdf
Principle 3: Areas that contribute most towards achieving a comprehensive, adequate and representative (CAR) protected area system should be prioritised	Proportion of NSW Landscapes permanently protected in the protected area system across public and private land (measure of 'adequacy') • NSW Map of areas protected or managed for conservation v1.0 • NSW Landscapes iar.environment.nsw.gov.au/dataset/nsw-mitchell-landscapes-version-3-1
Principle 4: Areas should be prioritised where high environmental value assets are under the greatest pressure	NSW Land and Soil Capability data.environment.nsw.gov.au/dataset/4BC12CBF-F119-4788-8C5A-A86466EC6412/html

Principle 1: Areas of high environmental value should be prioritised

Areas that have been prioritised contain a significant proportion of the high environmental value assets listed in Table 3. The high environmental value (HEV) assets identified are a subset of the mapped HEV criteria developed by Office of Environment and Heritage (OEH) to support the NSW Department of Planning and Environment's Regional Plans. It is acknowledged that there is a degree of variability in the scale and quality of data available for different parts of New South Wales.

Table 3 'High Environmental Value' criteria data description

HEV criteria	Description	Data
Threatened ecological communities	Includes any threatened ecological communities (TECs): vulnerable, endangered, or critically endangered ecological communities listed under the *Threatened Species Conservation (TSC) Act 1995*, the *Fisheries Management (FM) Act 1994* or the Commonwealth *Environmental Protection and Biodiversity Conservation (EPBC) Act 1999*. Lists of TECs are generated from the Threatened Species Profile Database and the Vegetation Types Database.	• Various vegetation data in the NSW OEH Vegetation Information System (VIS) www.environment.nsw.gov.au/research/VISmap.htm • VIS Classification database: www.environment.nsw.gov.au/NSWVCA20PRapp/LoginPR.aspx (must be a registered user). • Threatened Species Profile Database www.environment.nsw.gov.au/threatenedspecies/ • Protected matters search tool

HEV criteria	Description	Data
	Sourced from compilation of best available vegetation or plant community type (PCT) mapping. Includes consultation with regional vegetation mapping experts to determine the limitations and relative usefulness of available map products.	www.environment.gov.au/epbc/pmst/ • EPBC Species Profile and Threats (SPRAT) database www.environment.gov.au/cgi-bin/sprat/public/sprat.pl
Over-cleared (>70%) vegetation types	Over-cleared vegetation types are those in the Vegetation Types Database to be >70% cleared. Vegetation condition maps may not be available for all regions. Considers the 'best available' vegetation mapping that conforms to the classification in the Vegetation Types Database and maps the extant vegetation of these over-cleared vegetation types. The over-cleared vegetation types data is available from the Vegetation Information System (VIS) Classification database. The VIS catalogue describes the vegetation mapping available in a region. Includes consultation with regional vegetation mapping experts to determine the limitations and relative usefulness of available map products.	• VIS Classification Database www.environment.nsw.gov.au/NSWVCA20PRapp/LoginPR.aspx (must be a registered user) • Various vegetation data in the NSW OEH Vegetation Information System (VIS) www.environment.nsw.gov.au/research/vegetationinformationsystem.htm
Important wetlands	Identifies wetlands listed in the Directory of Important Wetlands Australia (DIWA) in NSW. Wetlands defined in SEPP 14 Coastal Wetlands with a 50-metre buffer applied.	• DIWA data.gov.au/dataset/6636846e-e330-4110-afbb-7b89491fe567 • SEPP 14 wetlands www.planningportal.nsw.gov.au/planning-tools/open-data
Koala habitat	Core Koala habitat identified in approved Koala management plans under SEPP 44 for LGAs.	• Approved SEPP 44 Koala plans www.environment.nsw.gov.au/animals/KoalaConservation.htm
Rainforest	Mapping of rainforest consistent with the definition used in Forestry Regulation, except in those areas where a detailed assessment of old growth forest and/or rainforest has been undertaken and are listed in the Private Native Forest Old Growth and Rainforest Assessment Public Register, where the more detailed and up-to-date data should be used.	• OEH corporate data set • Public Register: www.epa.nsw.gov.au/pnf/oldgrthrfrstassesspubreg.htm

HEV data for the threatened ecological community and over-cleared vegetation types criteria was unavailable for the Far West of NSW at the time of publication of the draft strategy. To supplement the HEV data set in this part of the state, an index has been developed from modelling that represents rarity and level of fragmentation of vegetation. The index has been derived from the Conservation Benefits mapping undertaken by OEH[1]. The scores in Table 4 were used to assess each NSW Landscape.

Table 4 HEV within NSW Landscapes

Proportion of NSW Landscape that is HEV	Score
>80%	4
60–80%	3
40–60%	2
20–40%	1
<20%	0

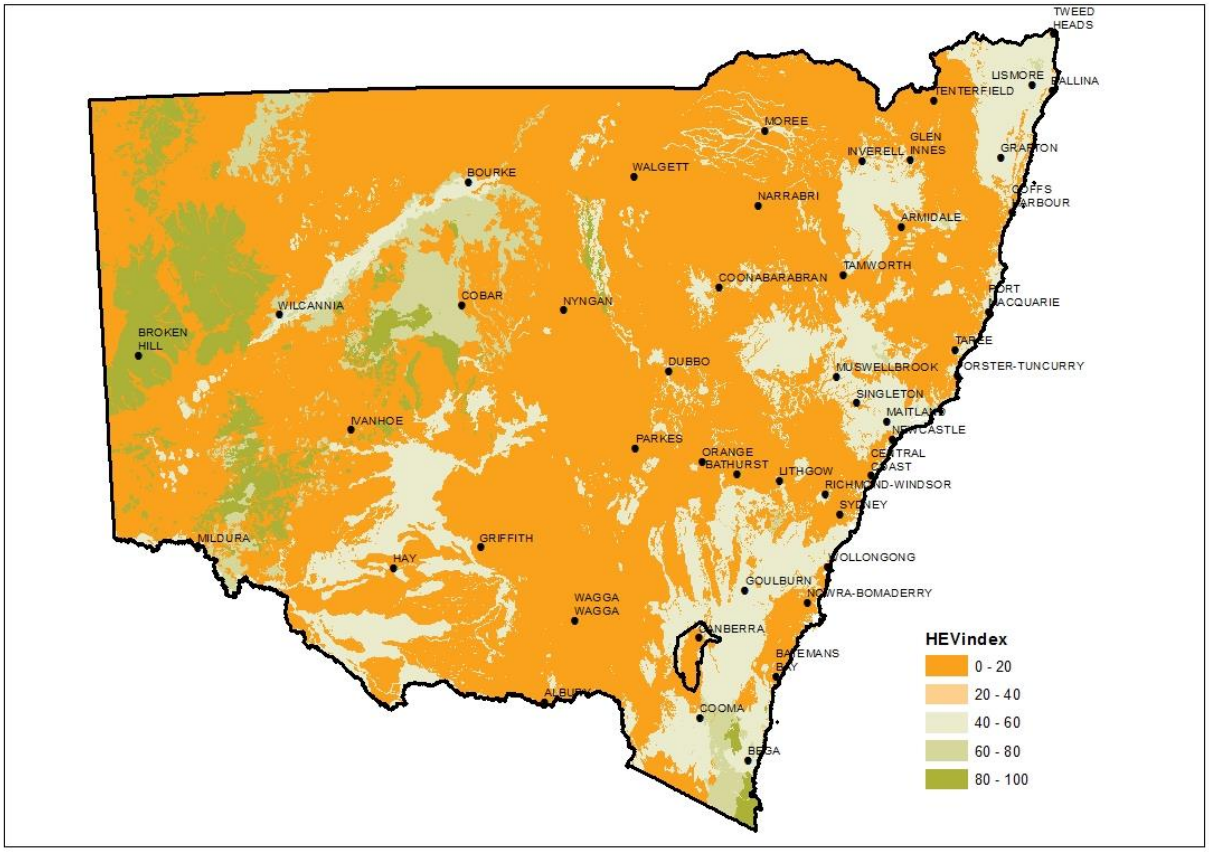

Figure 1 Proportion of high environmental value areas within NSW Landscapes

[1] Drielsma, M, Manion, G, Love, J, Williams, KJ, Harwood, T and Saremi, H 2015, *3C Modelling for Biodiversity under Future Climate,* NSW Office of Environment and Heritage https://www.terranova.org.au/repository/3c-modelling-east-coast-central-slopes-and-murray-basin-nrm-collection/draft-report-3c-modelling-for-biodiversity-management-under-future-climate

Principle 2: Areas that improve ecological connectivity should be prioritised

To address this principle, the extent of vegetation remaining in each NSW Landscape has been analysed. The highest priority is given to remnant vegetation that is located within over-cleared or 'fragmented' landscapes – generally those that have had 70–90% of their original vegetation removed. Native vegetation and habitat in landscapes which have had over 90% of their vegetation removed – highly cleared or 'relictual' landscapes – is likely to be so fragmented that viable 'core areas' may not exist. It is less likely that these landscapes will contain viable examples of the least protected ecosystems, compared to those landscapes that are 70–90% cleared.

On this basis, NSW Landscapes are classified into five categories and scored as described in Table 5.

Table 5 Proportion of NSW Landscape that is cleared

Proportion of NSW Landscape that is cleared	Description	Score
70–90%	Fragmented	4
> 90%	Relictual	3
50–70%	Variegated	2
30–50%	Variegated	1
< 30%	Intact	0

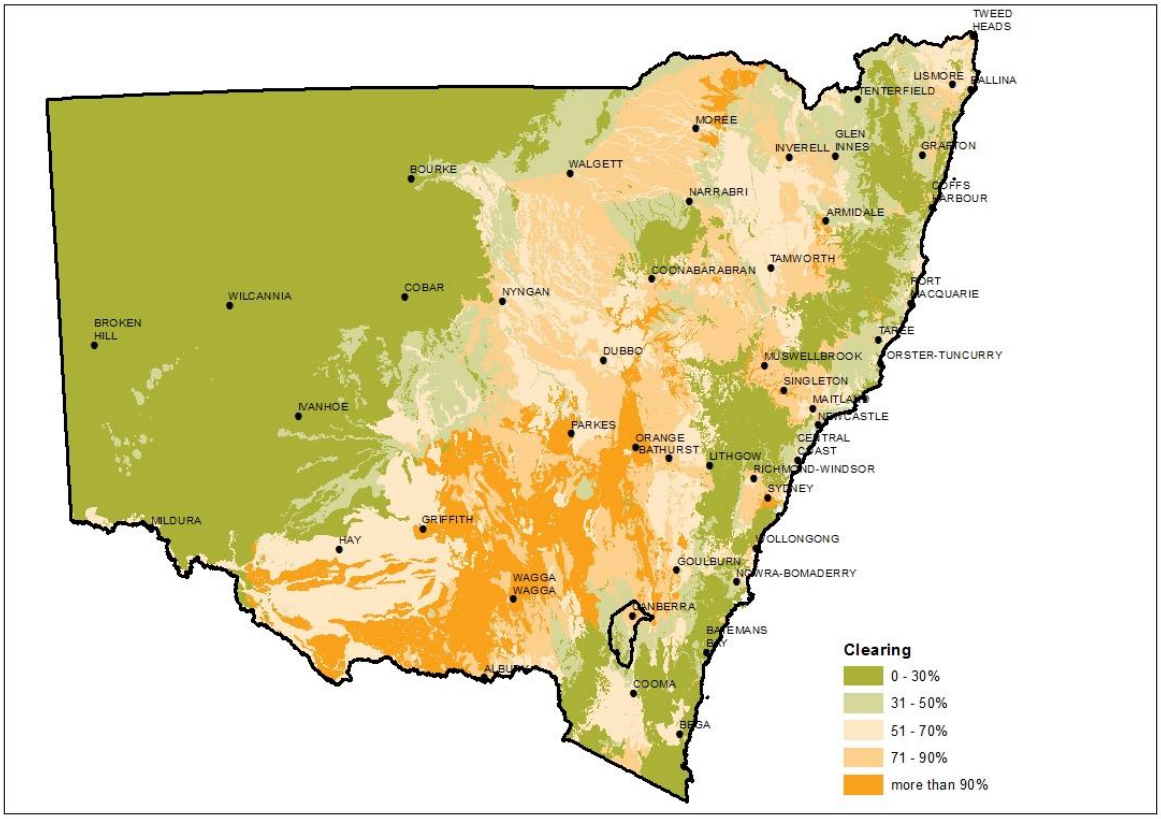

Figure 2 NSW Landscapes showing percentage of clearing

Principle 3: Areas that contribute most towards achieving a CAR protected area system should be prioritised

For the purpose of identifying priority investment areas, 'adequacy' has been defined as the relative progress of each NSW Landscape towards the Aichi target 11, which requires 17% of all terrestrial ecosystems to be permanently protected. An analysis of each NSW Landscape's progress towards this target was undertaken and the scores in Table 6 were applied to each NSW Landscape.

The process for analysing and applying progress towards 'comprehensiveness' and 'reprsentativeness' is described in detail under section 4 of this paper.

Table 6 'Adequacy' of NSW Landscapes

Proportion of NSW Landscape protected	Score
0–3%	4
4–7%	3
8–11%	2
12–16%	1
>=17%	0

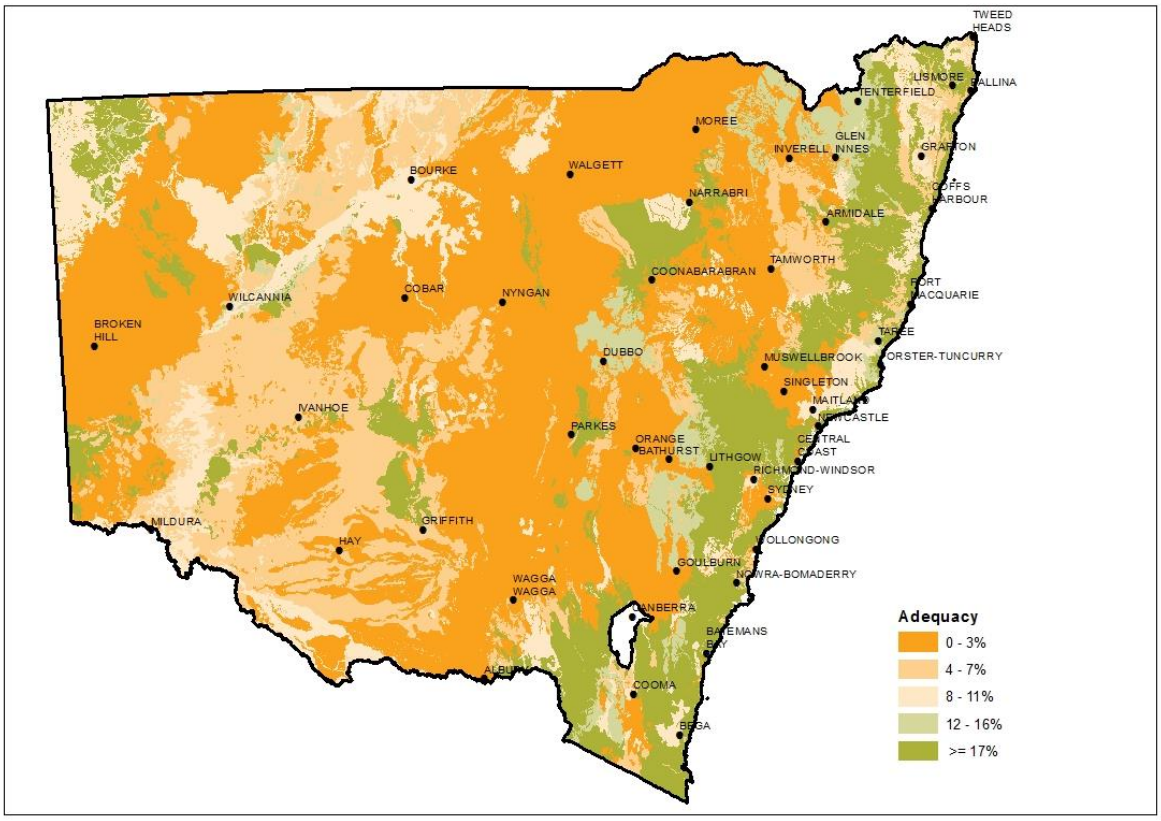

Figure 3 'Adequacy' (or proportion protected) of NSW Landscapes

Principle 4: Areas should be prioritised where high environmental value assets are under the greatest pressure

To address this principle, the average land and soil capability class of the NSW Landscape was considered. Land and soil capability classes 1, 2 and 3 are generally regarded as having high value for agricultural production and are therefore more likely to be subject to pressure from clearing and/or intensification. These landscapes have therefore been prioritised over landscapes that have higher constraints to agricultural production.

NSW Landscapes are classified into five categories based on land and soil capability and scored as described in Table 7.

Table 7 Average land and soil capability of NSW Landscapes

Average land and soil capability class	Score
1, 2 or 3	4
4	3
5	2
6	1
7 or 8	0

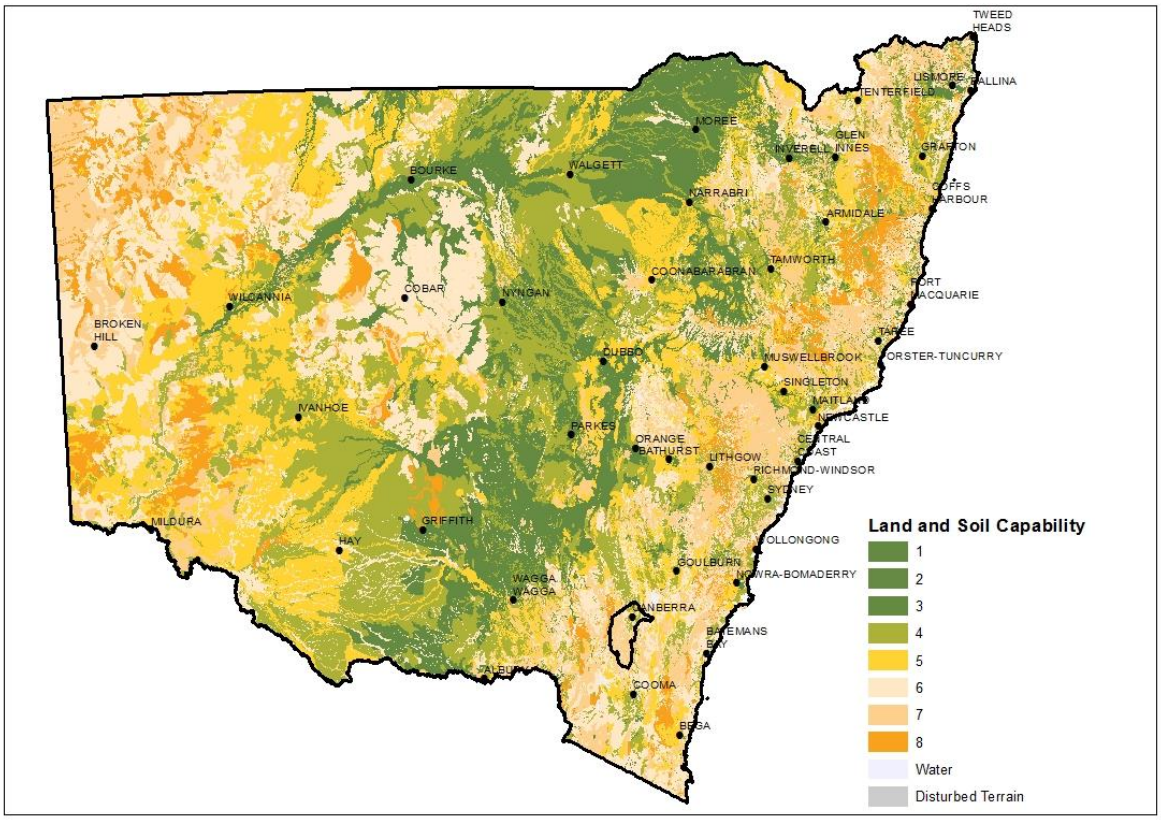

Figure 4 Average land and soil capability of NSW Landscapes

4. Prioritised NSW Landscapes

The scores for each of the data sets described in section 2 were combined with an equal weighting applied for each data set. The final score of each NSW Landscape was used to generate a statewide map of prioritised NSW Landscapes. The map classifies the landscapes into one of five classes using an 'equal interval' algorithm as described in Table 8 and shown in Figure 5.

Table 8 NSW Landscape priorities

NSW Landscape priority	Score
Highest	>2.6
High	1.95 – 2.6
Medium	1.3 – 1.95
Low	0.65 – 1.3
Lowest	<0.65

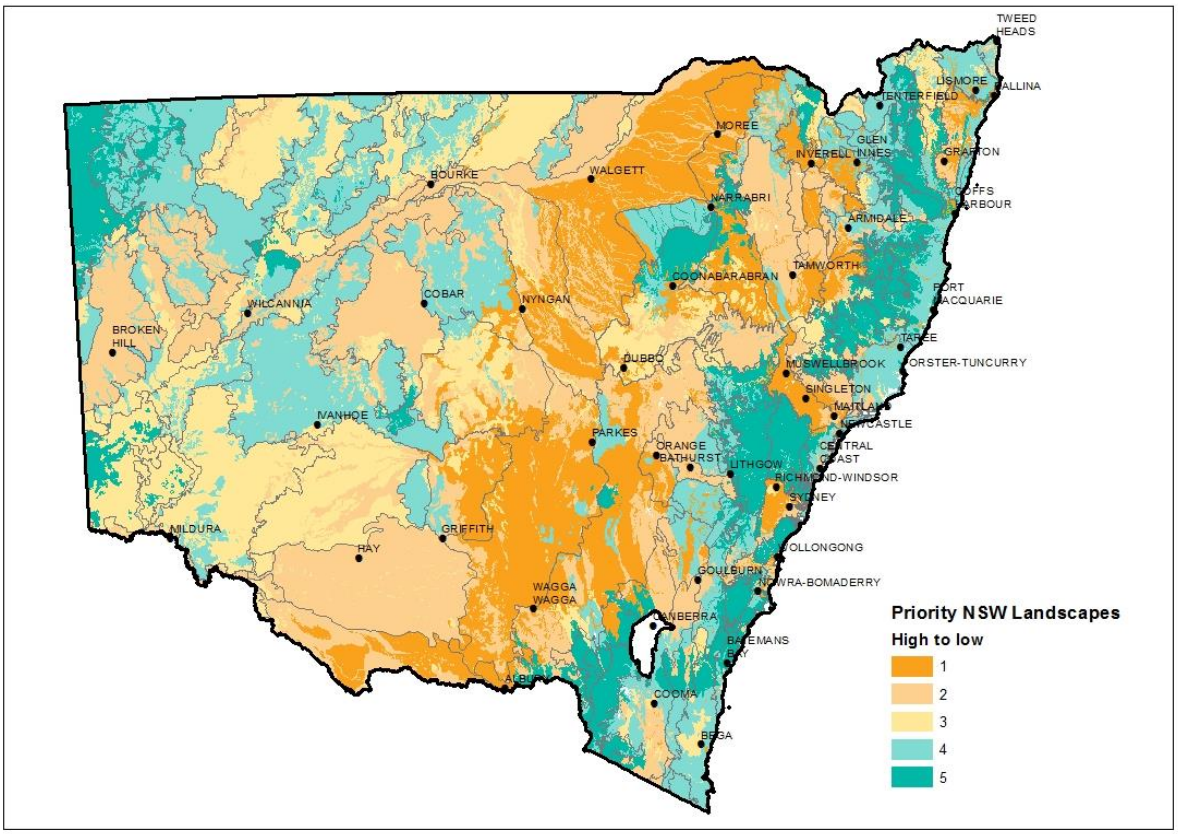

Figure 5 Priority NSW Landscapes

5. Applying the principles of 'comprehensiveness' and 'representativeness'

An analysis of the extent to which permanently protected areas are sampled in the protected area system across public and private land was undertaken for the purpose of measuring progress towards national targets for 'comprehensiveness' and 'representativeness'[2]. Permanently protected areas included in this analysis include:

- National parks estate under the *National Parks and Wildlife Act 1974*[3]
- Conservation Agreements under the *National Parks and Wildlife Act 1974*
- Nature Conservation Trust Agreements under the *Nature Conservation Trust Act 2001*
- Biobank Agreements under the *Threatened Species Conservation Act 1995*
- Conservation, Incentive and Offset Property Vegetation Plans (PVPs) that are for biodiversity and in-perpetuity under the *Native Vegetation Act 2003*
- Flora Reserves under the *Forestry Act 2012*
- Registered Property Agreements that are in-perpetuity under the *Native Vegetation Conservation Act 1997.*

A full list of areas protected and managed for conservation, and the related legislation, is provided in Table 3 of the draft strategy.

Comprehensiveness

Under *Australia's Strategy for the National Reserve System 2009–2030*, 'comprehensiveness' refers to 'the aim of including, within protected areas, samples of the full range of regional ecosystems recognisable at an appropriate scale within and across each IBRA bioregion' (NRMMC 2009). The following national 'comprehensiveness' target has been agreed to by all Australian states and territories:

- examples of at least 80% (by number) of all regional ecosystems in each IBRA bioregion will be represented in the National Reserve System by 2015.

A total of 7 of the 18 bioregions in New South Wales have met the national target (Figure 6).

[2] See section 1.4 of the strategy for further information about the national targets.

[3] This includes national parks, historic sites, state conservation areas, regional parks, karst conservation areas, nature reserves and Aboriginal areas.

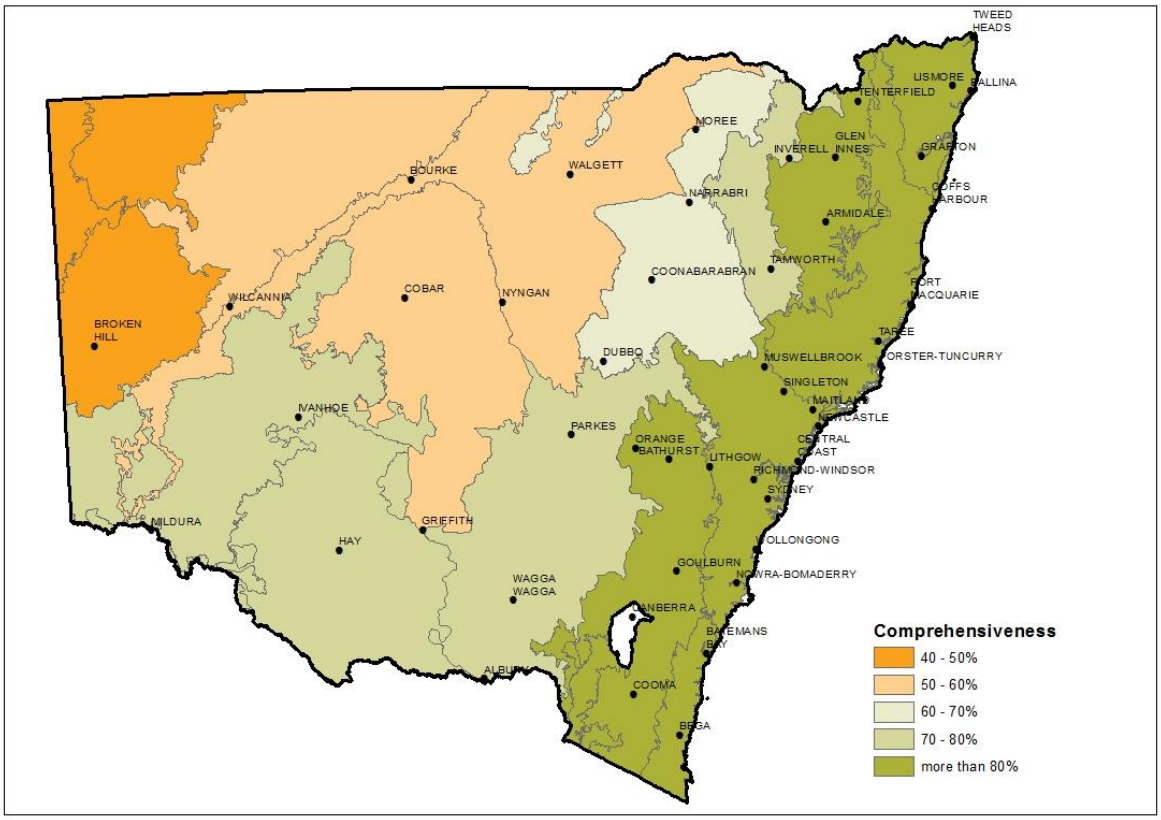

Figure 6 Progress towards ‘comprehensiveness’

Representativeness

Under Australia’s Strategy for the National Reserve System 2009–2030, ‘representativeness’ is ‘comprehensiveness considered at a finer scale (IBRA subregion), and recognises that the regional variability within ecosystems is sampled within the reserve system’ (NRMMC 2009). The following national ‘representativeness’ target has been agreed to by all Australian states and territories:

- examples of at least 80% (by number) of all regional ecosystems in each IBRA subregion will be represented in the National Reserve System by 2025.

A total of 59 of the 131 subregions in NSW have met the national target (see Figure 7).

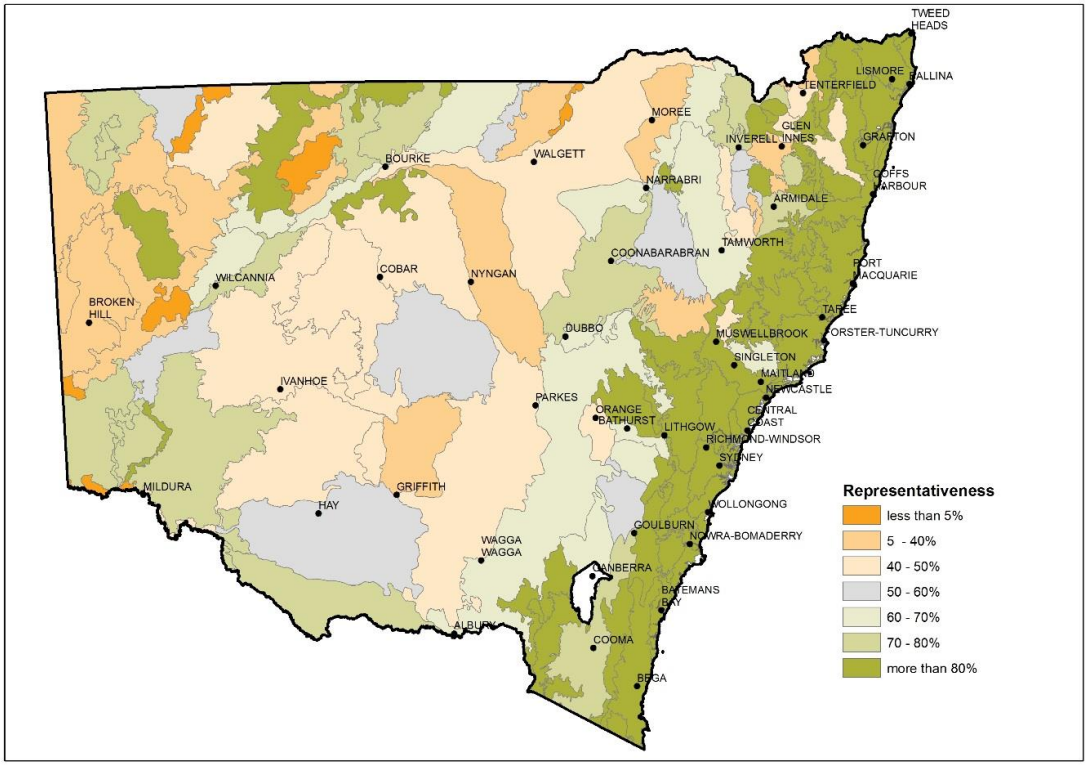

Figure 7 Progress towards 'representativeness'

Candidate areas for investment

There are a number of subregions that are below the 80% target for 'representativeness' but are within bioregions that meet the 80% target for 'comprehensiveness'. These subregions, together with all other subregions that do not meet the national 'representativeness' target, have been identified as potential candidates for investment. (See Figure 8.)

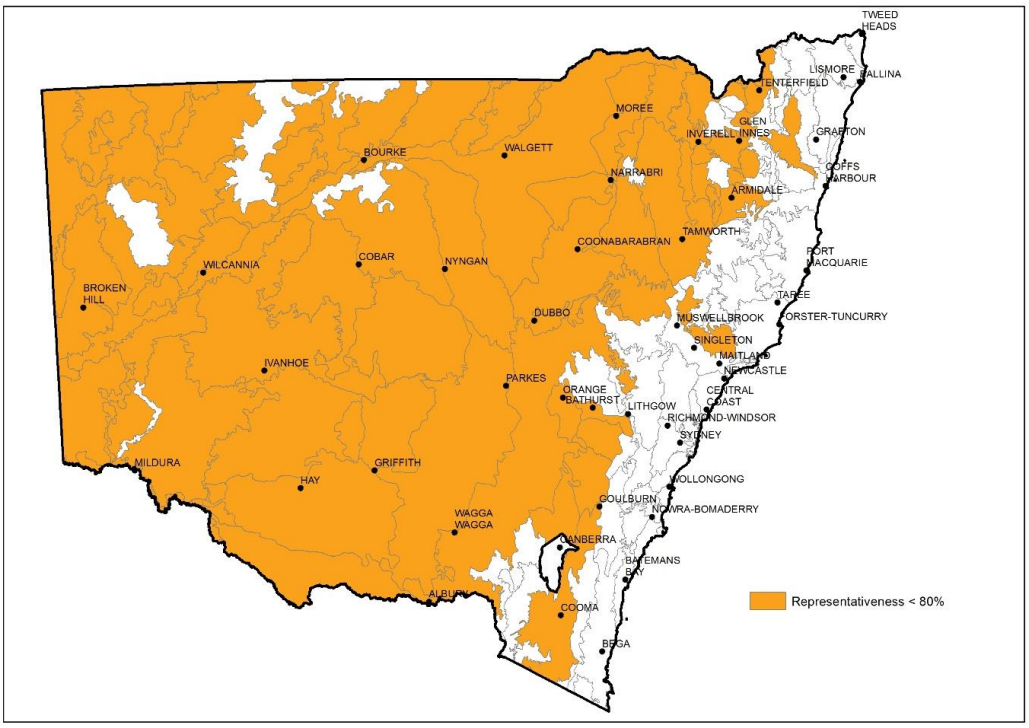

Figure 8 Subregions below 80% 'representativeness'

6. Identifying priority investment areas

The identification of priority investment areas in the strategy follows a bioregional conservation planning approach with IBRA subregions used as the boundaries for priority investment areas. The subregions have been ranked and grouped as per the aggregate score for NSW Landscapes (depicted in Figure 5) occurring in that subregion.

This identifies priority investment areas as the under-represented IBRA subregions with the highest concentration of high priority NSW Landscapes. The subregions are further delineated into five orders of priority (using a quantile classification method) as depicted in the map at Figure 9. The subregions that are not within one of the five orders of priority are those that already meet their 80% 'representativeness' target.

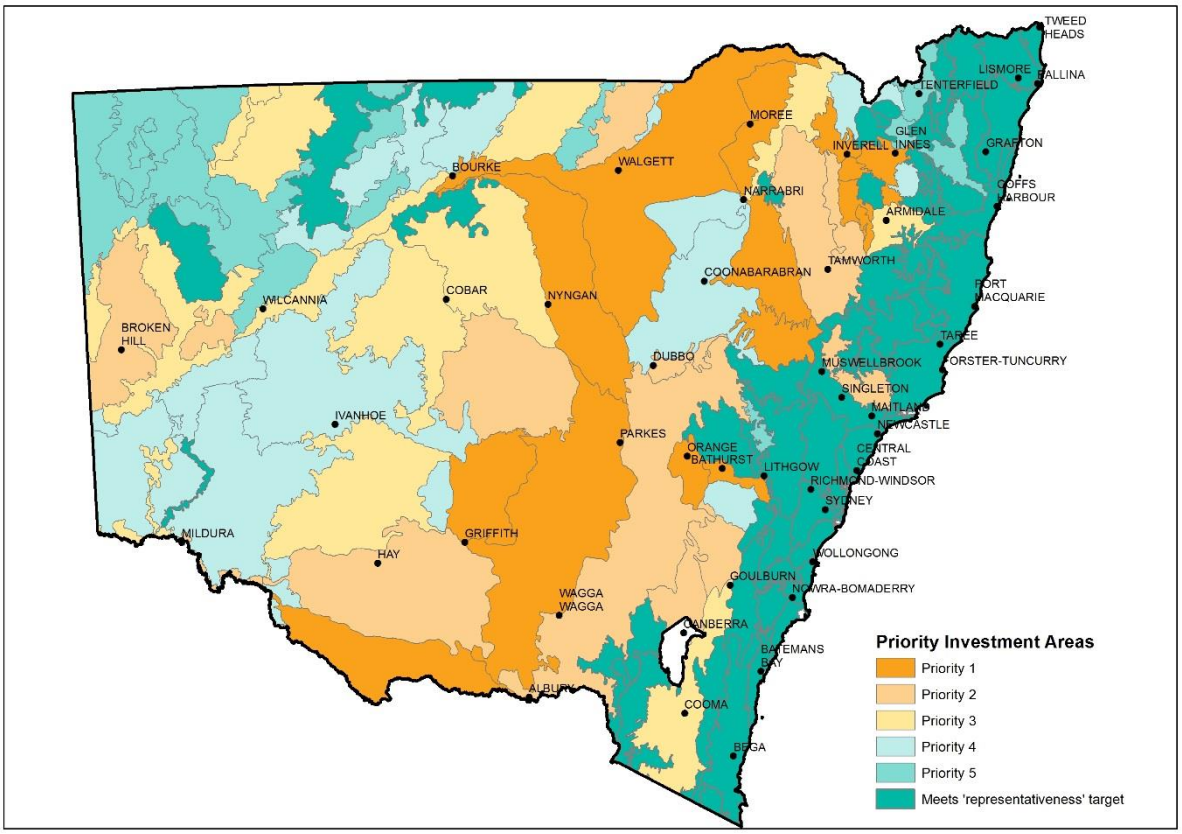

Figure 9 Map of priority investment areas

7. Priority investment areas

Table 9 Priority 1 investment regions

Priority 1	IBRA subregion		IBRA bioregion
	Bundarra Downs Glen Innes-Guyra Basalts	Tingha Plateau Yarrowyck-Kentucky Downs	New England Tablelands
	Northern Outwash Liverpool Plains	Liverpool Range	Brigalow Belt South
	Castlereagh-Barwon	Bogan-Macquarie	Darling Riverine Plains
	Orange	Bathurst	South Eastern Highlands
	Murray Fans		Riverina
	Inverell Basalts		Nandewar
	Lower Slopes		NSW South Western Slopes
	Lachlan Plains		Cobar Peneplain

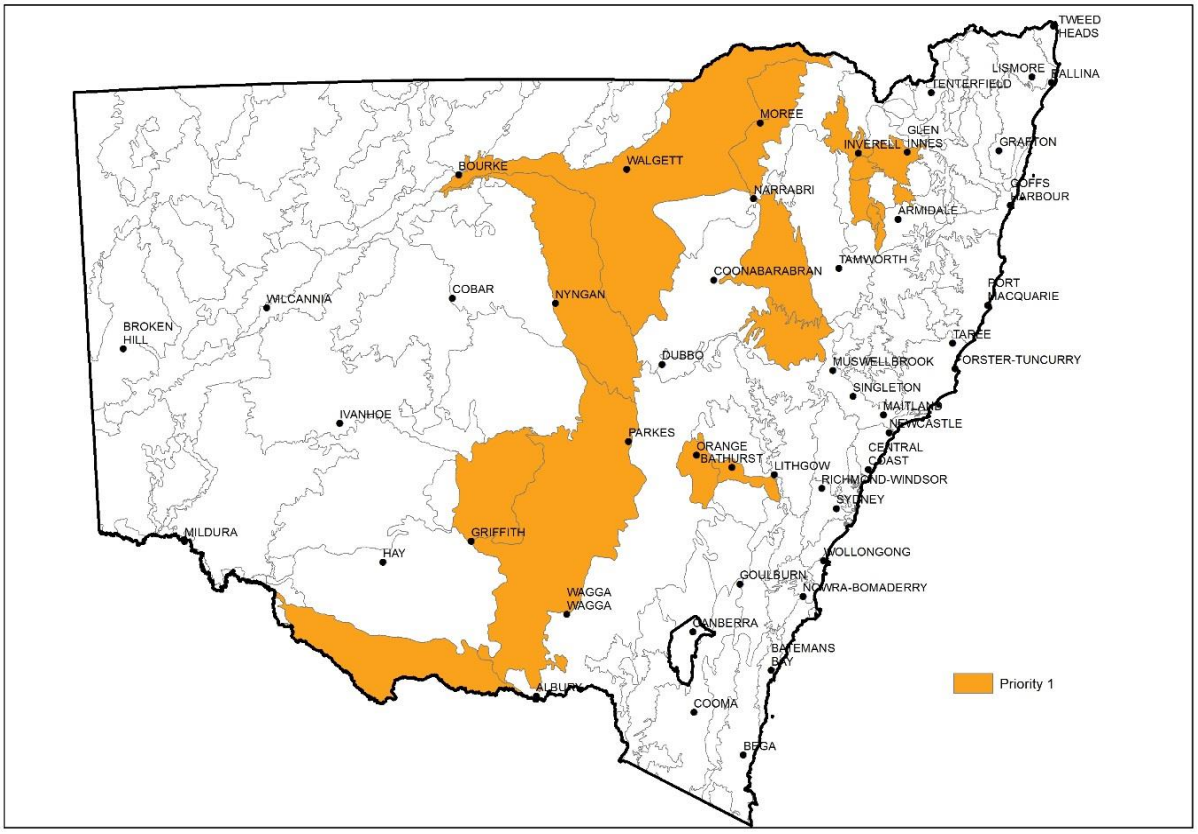

Figure 10 Map of priority 1 investment areas

Table 10 Priority 2 investment regions

Priority 2	IBRA subregion		IBRA bioregion
	Eastern Nandewars		New England Tablelands
	Crookwell	Murrumbateman	South Eastern Highlands
	Scopes Range	Barrier Range	Broken Hill Complex
	Upper Hunter	Ellerston	NSW North Coast
	Murrumbidgee	Robinvale Plains	Riverina
	Warrambool-Moonie		Darling Riverine Plains
	Nymagee		Cobar Peneplain
	Peel		Nandewar
	Sunshine Coast-Gold Coast Lowlands		South Eastern Queensland
	Talbragar Valley		Brigalow Belt South
	Inland Slopes		NSW South Western Slopes

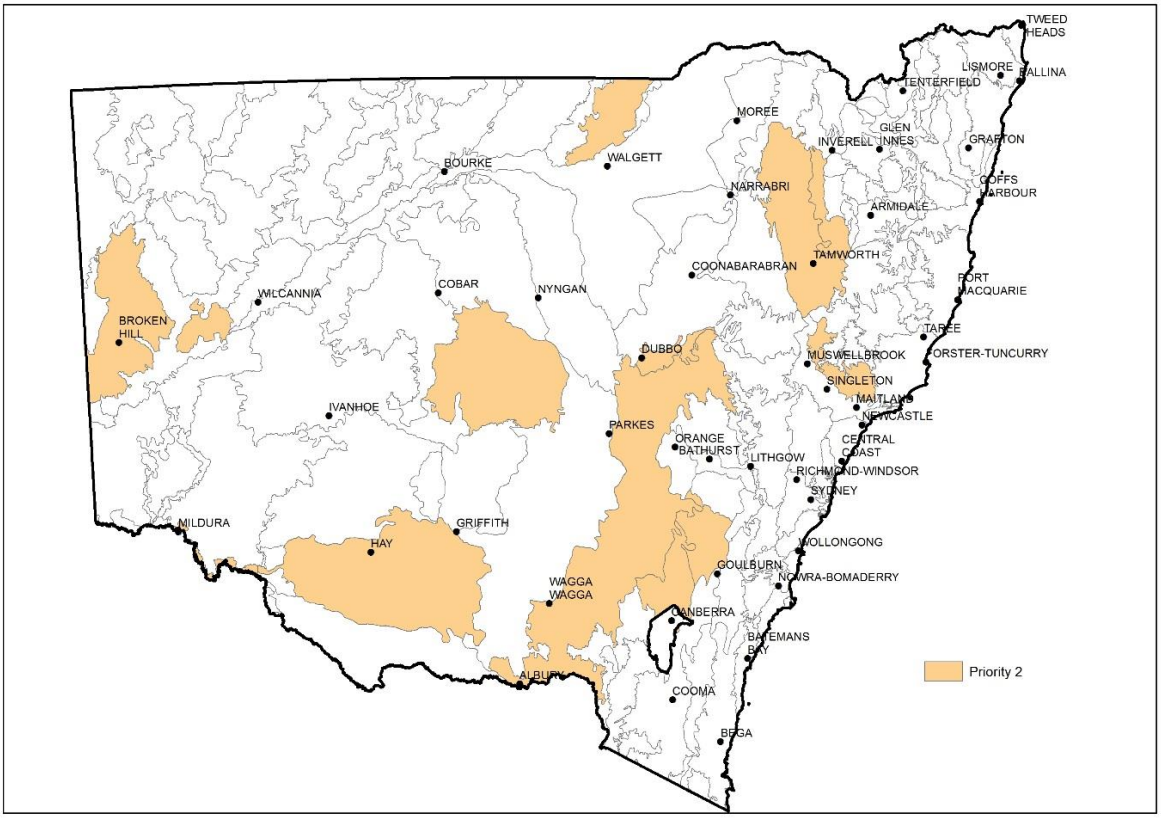

Figure 11 Map of priority 2 investment areas

Table 11 Priority 3 investment regions

Priority 3	IBRA subregion		IBRA bioregion
	Louth Plains Culgoa-Bokhara Wilcannia Plains	Great Darling Anabranch	Darling Riverine Plains
	Murray Scroll Belt	Lachlan	Riverina
	Canbelego Downs	Barnato Downs	Cobar Peneplain
	Monaro		South Eastern Highlands
	Armidale Plateau		New England Tablelands
	Northern Basalts		Brigalow Belt South
	Barrier Range Outwash		Broken Hill Complex
	Bulloo Dunefields		Channel Country
	Ursino Sandplains		Mulga Lands

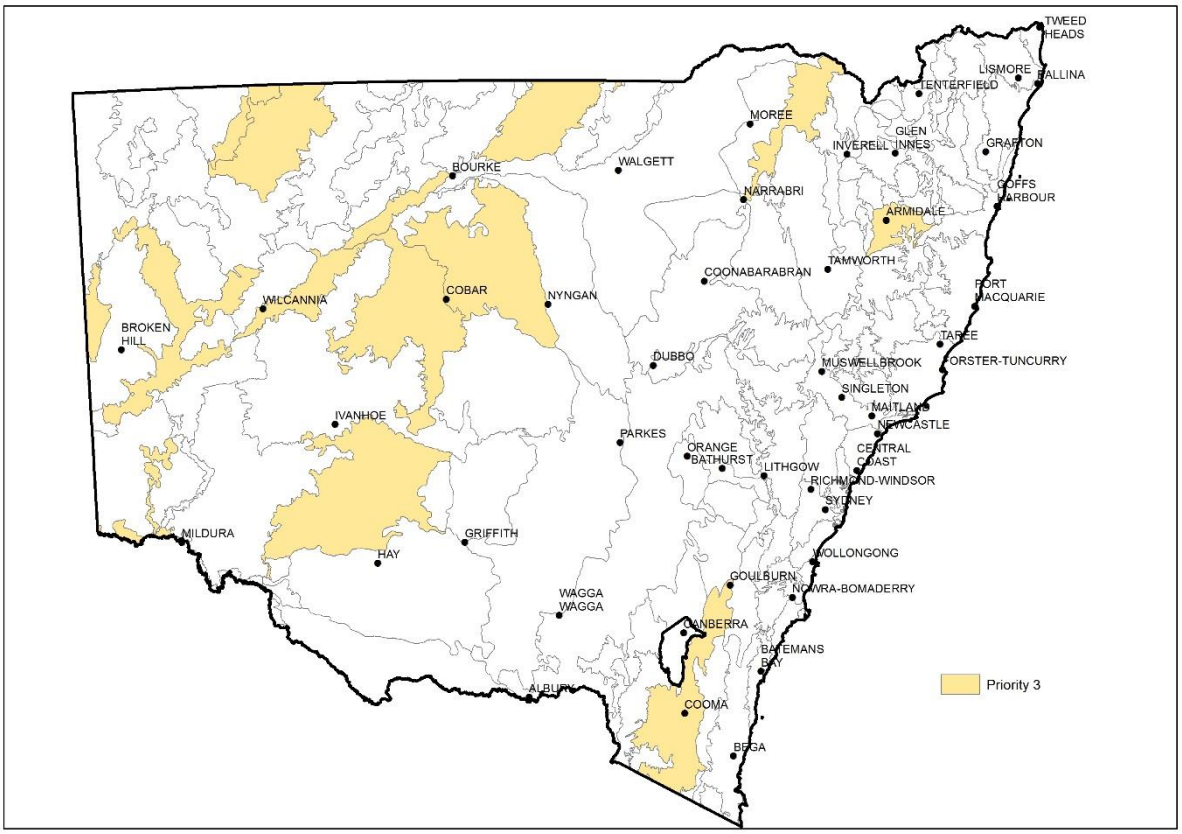

Figure 12 Map of priority 3 investment areas

Table 12 Priority 4 investment regions

Priority 4	IBRA subregion		IBRA bioregion
	Warrego Sands Paroo Overflow	Nebine Plains Kerribree Basin	Mulga Lands
	Pilliga Pilliga Outwash	Moonie-Barwon Interfluve	Brigalow Belt South
	Braemer South Olary Plain	Darling Depression	Murray Darling Depression
	Oberon		South Eastern Highlands
	Nandewar Northern Complex		Nandewar
	Menindee		Darling Riverine Plains
	Nightcap		New England Tablelands

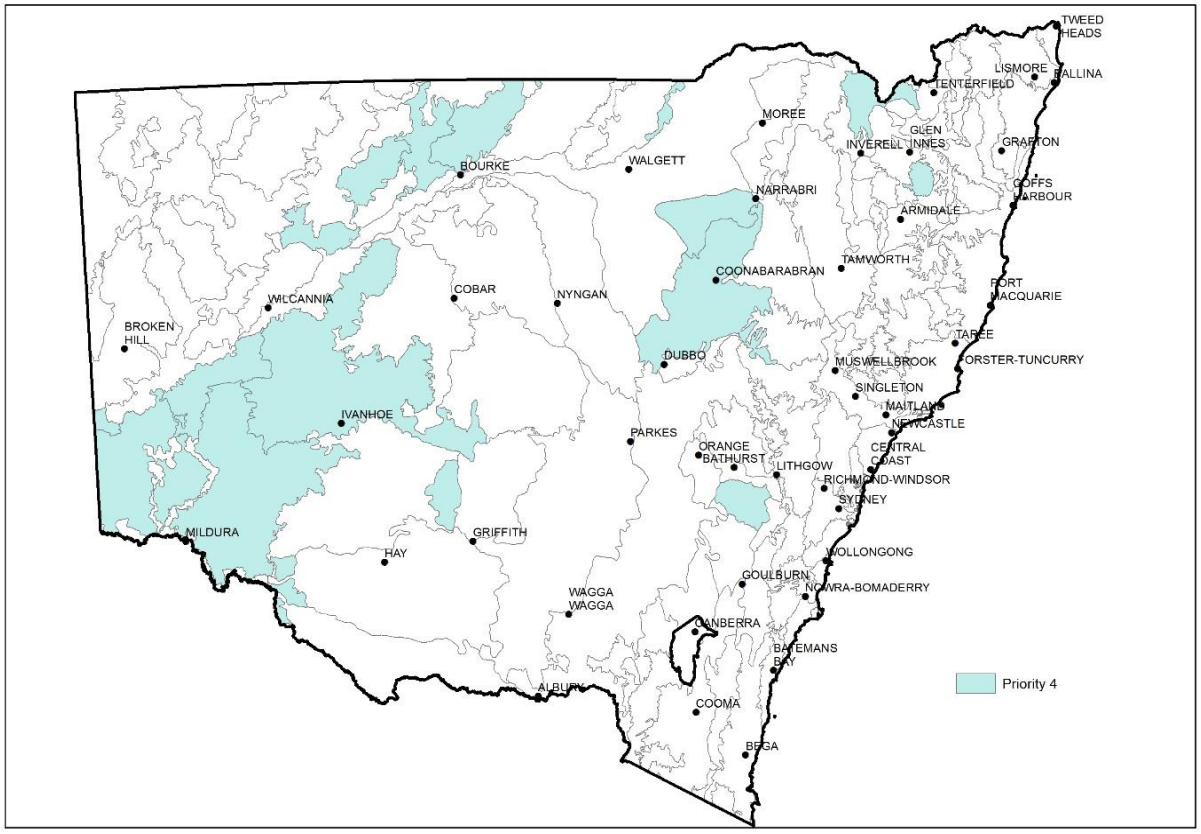

Figure 13 Map of priority 4 investment areas

Table 13 Priority 5 investment regions

Priority 5	IBRA subregion		IBRA bioregion
	Deepwater Downs Tenterfield Plateau	Stanthorpe Plateau	New England Tablelands
	Core Ranges Central Depression	Bulloo Sturt Stony Desert	Channel Country
	Dalmorton		NSW North Coast
	White Cliffs Plateau Paroo-Darling Sands	West Warrego	Mulga Lands
	Narrandool		Brigalow Belt South
	Strzelecki Desert		Simpson Strzelecki Dunefields
	Capertee Valley		NSW South Western Slopes

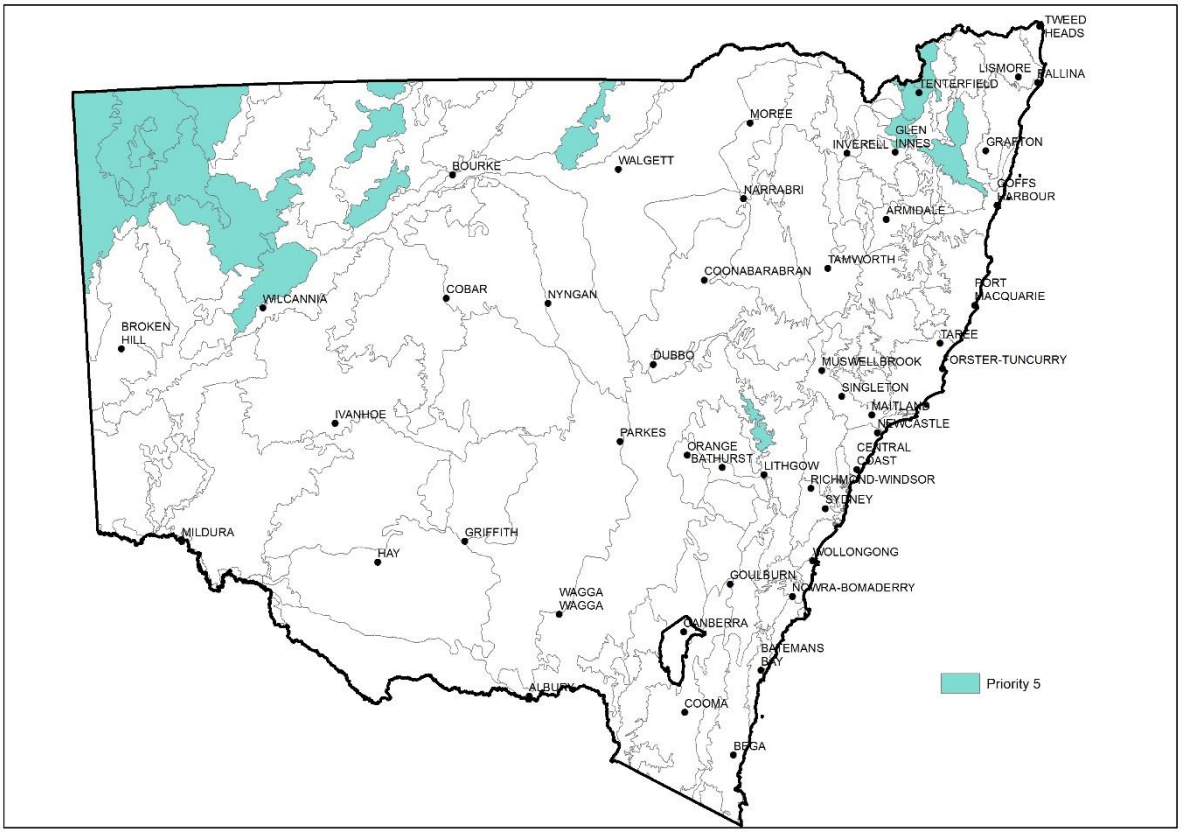

Figure 14 Map of priority 5 investment areas