NSW GOVERNMENT | Office of Environment & Heritage

Biodiversity Investment Opportunities Map

Mapping Priority Investment Areas for the Illawarra Region

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Cover photo: The Illawarra coastal plain and escarpment.

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Summary

The Office of Environment and Heritage (OEH) is currently delivering the $10.1-million Linking Landscapes through Local Action project ('Linking Landscapes'), which is part of the NSW Government's Green Corridors Program. Linking Landscapes includes the Biodiversity Investment Opportunities Map (BIO Map) project, which supports the Government's NSW 2021 commitment (Goal 22 Target 2) to 'identify land of strategic conservation value'.

BIO Map identifies Priority Investment Areas (PIAs) where the protection and management of native vegetation can be of greatest benefit to biodiversity. The PIAs identified include:

- **core areas:** large remnants where management will be of greatest benefit to the conservation of key state and regional biodiversity values within a region
- **state and regional biodiversity corridors:** linear areas that link core areas and play a crucial role in maintaining connections between animal and plant populations that would otherwise be isolated and at greater risk of local extinction.

BIO Map can be used as a decision-support tool for funding bodies, including government grant providers. It provides a single, accessible map that will help funding bodies to identify priority areas for biodiversity investment and help ensure that funds are targeted to areas of greatest strategic benefit, based on an assessment of regional-scale biodiversity and stakeholder values.

In addition to informing funding bodies, the identification of PIAs will provide useful information for landowners and land managers on the areas that have increased potential for receiving biodiversity management funds. As such, BIO Map may increase the opportunities for landowners to receive funding to protect their bushland, but participation in any funding program is entirely voluntary. BIO Map will also help community organisations to identify the sites that are the most appropriate targets for their efforts.

BIO Map was not developed to inform land-use planning or development applications, and it is not intended to be used for land-use planning. The reason for this is that BIO Map does not identify all significant vegetation or populations of threatened species, and therefore it cannot be assumed that areas not identified as PIAs are of lower environmental value. A finer scale of assessment than that provided by BIO Map is required to support statutory planning processes and decisions. The limitations and assumptions of BIO Map are set out in detail in section 1.5 of this report.

Landowners' rights to carry out activities such as agriculture and development are not altered by their properties being identified as being within PIAs. However, areas within PIAs may have environmental values that need to be considered as part of existing statutory planning and development approval processes and that would require an appropriately scaled level of environmental assessment, as specified by the relevant planning or consent authority. The identification of land as a PIA does not alter these existing requirements in any way.

BIO Map has been prepared for the Illawarra region, an area that includes the Illawarra coastal plain and escarpment and part of the Woronora and Budderoo plateaus. Another BIO Map project ran concurrently for the Cumberland subregion of western Sydney (OEH in preparation).

PIAs were mapped from a combination of existing and established data and from new data layers created specifically for the project. To identify core areas, a seamless vegetation layer was made from 20 separate fine-scale vegetation maps. Vegetation types were then assigned to a single, state-wide classification (i.e. Plant Community Type) and to Threatened Ecological Communities listed in NSW. Core areas for BIO Map were identified as patches of Threatened Ecological Community of 10 hectares or more.

Biodiversity corridors for the Illawarra BIO Map were adopted directly from the Illawarra Biodiversity Strategy, which was jointly prepared by Wollongong, Shellharbour and Kiama councils in 2011 (Wollongong City Council et al. 2011). This ensured a high level of consistency between existing regional strategies and this BIO Map project. The method used to identify and map PIAs is described in full in section 3 and in the appendices.

Targeted stakeholder consultation informed and improved the outputs of the project. Nine state government authorities, four local councils and six non-government organisations were engaged to comment on the draft map. Suggestions from stakeholders were assessed against the mapping criteria and (where appropriate) were incorporated into the final BIO Map. The feedback was entirely positive or neutral, with six core areas added to, or expanded, on the basis of stakeholder feedback and the incorporation of more accurate local information.

The final Illawarra BIO Map is presented in Figure 2. The map shows core areas and the network of regional biodiversity corridors within the Illawarra region. The total area represented within the mapped PIAs is 66 827 hectares, comprising 13 980 hectares of core area and 52 847 hectares of corridors. This represents about 59% of the Illawarra region.

Jedda Lemmon

The Illawarra escarpment and plateau are covered mostly by undisturbed vegetation, whereas the foothills and coastal plain are highly cleared and fragmented.

1. Introduction

1.1 Background

The Biodiversity Investment Opportunities Map (BIO Map) identifies Priority Investment Areas (PIAs) where the protection and management of native vegetation can be of greatest benefit to biodiversity. The use of a BIO Map can help to transparently guide the distribution of biodiversity funding. This report describes the development of a BIO Map for the Illawarra region of NSW. A similar project ran concurrently in the Cumberland subregion of western Sydney and is reported on separately (OEH in preparation).

BIO Map has been prepared to help achieve better biodiversity outcomes from the funding available for protecting, conserving and managing remnant natural landscapes. BIO Map provides a guide for effective investment in biodiversity by targeting biodiversity funding to the strategic locations of greatest benefit. Selected areas that have high biodiversity and connectivity value and are not currently identified for urban, industrial or infrastructure development have been identified as PIAs on BIO Map.

BIO Map can be used by organisations that have a role in distributing biodiversity investment funds. PIAs can be targeted by investment funds through a range of sources, including grant programs, incentive programs, and restoration programs. BIO Map provides a template for a connected area network that can be used by federal, state and local government agencies, as well as non-government organisations, to ensure both that limited funds are targeted to the strategic areas of greatest benefit and that the process of distributing funds is transparent. BIO Map may also provide useful information for landowners and land managers on the areas that have increased potential of receiving biodiversity management funds.

Inclusion of land within a BIO Map does not affect a property's development or land-use entitlements. However, areas within PIAs may have environmental values that need to be considered as part of existing statutory planning and development approval processes. In the case of properties that are within a PIA, there may be increased opportunities for the landowners to receive funding to protect their bushland, but participation in any funding program is entirely voluntary.

1.2 Green Corridors Program

BIO Map was developed by the NSW Office of Environment and Heritage (OEH) as part of the NSW Government's Green Corridors Program, which is a government priority action under Goal 22 of NSW 2021: A plan to make NSW number one. The Green Corridors Program is a NSW Environmental Trust-funded program that protects strategic areas of high conservation value vegetation and ensures that there will be more green spaces across Sydney and NSW. The program was implemented with $40 million of funding over 4 years (2011–12 to 2014–15).

The Green Corridors program encompasses four component programs:

- Great Eastern Ranges Initiative
- Green Corridor Reserves
- Growth Centres Biodiversity Offset Program
- Linking Landscapes through Local Action Program.

These component projects operate by:

- linking public and private land conservation via partnerships with local landholders, industry groups, traditional owners, government, non-government organisations (NGOs) and community groups
- purchasing land to add to the reserve system
- private land conservation
- stakeholder identification of corridor locations for strategic biodiversity investment.

BIO Map is part of the Linking Landscapes through Local Action Program, which uses stakeholder engagement to identify corridors for strategic biodiversity investment. The Linking Landscapes through Local Action Program received $10.1 million of funding for three components:

- Biodiversity Investment Opportunities Map (BIO Map): to identify PIAs for biodiversity management within two subregions in the Sydney Basin Bioregion
- a grant program that provides funds to establish BioBank sites to protect and manage public land with identified conservation values
- Conservation Commitments Database: to develop a database that will allow public agencies to identify lands that are protected via secure conservation mechanisms through this and other projects across the state.

BIO Map is a concept that can be applied region-by-region across the state. The Illawarra BIO Map is one of two BIO Map projects, the other being the Cumberland BIO Map, which was developed simultaneously. The success of the two projects will inform the potential for future projects.

1.3 Study area

The Illawarra BIO Map study area covers a 112 942-hectare area defined by the Kiama, Shellharbour and Wollongong Local Government Areas (LGAs) (Figure 1). This includes the Illawarra coastal plain and escarpment and the eastern parts of the sandstone plateau to the west. Each of these landscapes provides a diversity of vegetation types, habitats and landforms, which combined make the region rich in overall biodiversity values.

Overall, the Illawarra study area has a relatively large proportion of protected areas, with 13 904 hectares (12%) included in the National Parks and Wildlife Service (NPWS) reserve system and a further 31 895 hectares (28%) in Water NSW Special Areas that are protected for the management of Sydney's drinking water catchments. These protected areas are largely confined to the escarpment and sandstone plateau in the western part of the study area. Across the entire Illawarra, the vegetation cover is approximately 65 per cent of that before 1750.

Vegetation has been cleared disproportionately on the coastal plain. Agriculture and urban development of the escarpment and plateau have been limited by the steep topography and low fertility of the sandstone plateau and by the need to protect the drinking water supply assets it contains. In comparison, the coastal plain has been extensively cleared for agricultural, urban and industrial activities.

With further development planned, particularly in the south-west of the Wollongong LGA, and with the Illawarra's population expected to grow by 65 050 by 2031 (Department of Planning and Environment 2014), it is essential that plans for the management and enhancement of the remaining areas of native vegetation be made in a strategic, cost-effective and efficient way. The Illawarra BIO Map has been developed to help direct biodiversity investment in the region.

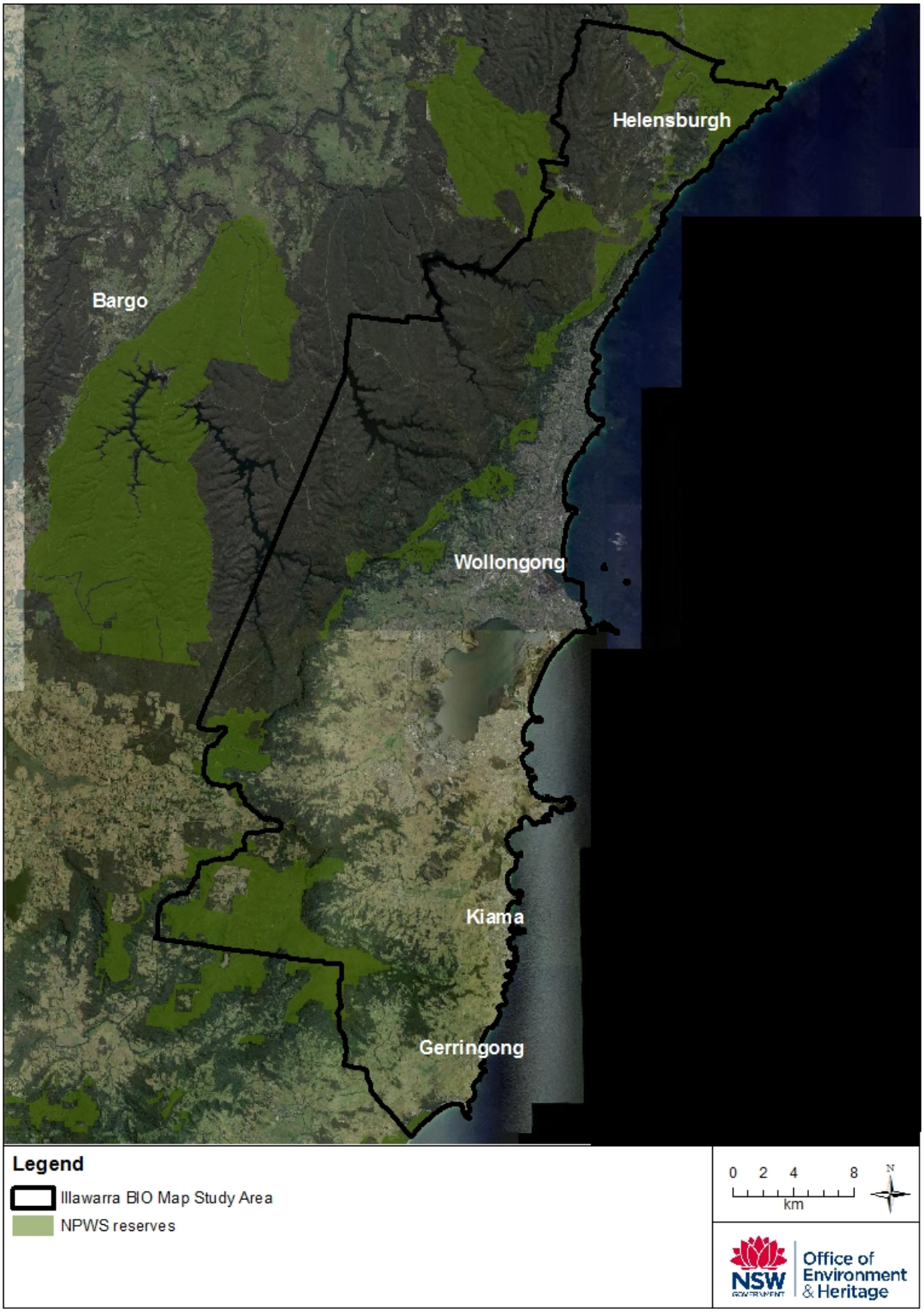

Figure 1 The Illawarra BIO Map study area

1.4 Priority Investment Areas

Priority Investment Areas, or PIAs, are the areas identified for priority investment of biodiversity funds. PIAs comprise:

- **core areas:** areas of native vegetation and habitat where management will be of greatest benefit to the conservation of state and regional biodiversity values within a region
- **state biodiversity corridors:** key linkages of native vegetation that are identified through state-wide analysis and provide connectivity between Interim Biogeographic Regionalisation of Australia (IBRA) regions and subregions.[1]
- **regional biodiversity corridors:** key linkages of native vegetation within an IBRA subregion, between IBRA subregions or between significant biodiversity features.

The mapping of PIAs draws on the conceptual framework developed for previous state-wide mapping of priority areas for native vegetation management (Drielsma et al. 2012). This state-wide mapping is at a broad scale suitable for regional planning. BIO Map extends the principles of this mapping to a finer scale, incorporating related local- and regional-scale information where suitable and available.

Mapping criteria were developed to identify and map PIAs. Developing these criteria helped to ensure that mapping in the study area was done consistently, while allowing for differences in data availability and land-use constraints.

1.5 Assumptions and limitations

BIO Map is a single-purpose product designed to direct biodiversity funding to areas where it can have the greatest benefit.

BIO Map was not developed to inform land-use planning or development applications and is not intended to be used for land-use planning. The reason for this is that BIO Map does not identify all significant vegetation, Threatened Ecological Communities and populations of threatened species in the Illawarra region, and therefore it cannot be assumed that areas not identified as PIAs are of lower environmental value. A finer scale of assessment than that provided by BIO Map is required to support statutory planning processes and decisions.

BIO Map in itself does not protect land or affect a property's development or land-use entitlements. There is no guarantee that land within the PIAs will be conserved, because protection and management depend entirely on the willingness of landowners.

BIO Map does not identify all state and regional PIAs. For example, the Saving our Species program identifies additional priorities for threatened species. Important habitats and populations of threatened species occur across the Illawarra region on land with natural and urbanised land uses. Hollow-bearing trees are an example of an important habitat element in the Illawarra region that was not targeted by BIO Map. BIO Map is not a comprehensive inventory of all environmentally significant sites and is not a substitute for appropriate scale-site-based assessments.

BIO Map is only one of a suite of strategies and tools that can contribute to nature conservation in the Illawarra region. BIO Map does not remove the need for investment in threatened species, particular landscape units, or corridor types that are outside PIAs. BIO Map also does not remove the need for further studies on the location of significant natural

[1] IBRA subregions are areas defined under Interim Biogeographic Regionalisation of Australia version 7 (Commonwealth of Australia 2012)

elements or the development of new or additional programs. BIO Map is a regional-scale map and does not identify local priorities, including local corridors.

BIO Map identifies corridors that link core areas and other significant remnants at a regional scale. The corridors identified in BIO Map are generally vegetated, and their degree of viability has been largely assumed from their current land use and from Local Environmental Plan (LEP) zoning. These corridors provide general habitat cover for spatial and temporal movement of species and genetic material. The corridors are not designed for specific species or ecological purposes other than linking BIO Map core areas and other significant areas of native vegetation. Where corridors are required for a specific purpose, assessment of the worth of BIO Map corridors for that purpose is recommended.

BIO Map was developed by using regional-scale data. The map should be viewed at 1:15 000 scale. The method for developing BIO Map is set out in section 3.

Targeted ground-truthing to confirm vegetation extent or type (as defined in the regional vegetation maps) was done as part of the preparation of BIO Map (see section 3). As the core areas and regional biodiversity corridors are largely based on vegetation mapping, any inconsistencies in this mapping may be transferred to the identification of PIAs. PIAs identified and mapped by BIO Map were reviewed by stakeholders who had both local knowledge and access to local-scale vegetation maps. Although local knowledge was a very useful tool in developing BIO Map, it is possible that not all stakeholders contributed knowledge equally. Out-of-date maps and aerial photographs, as well as inconsistencies in stakeholder input, may have resulted in errors or inconsistencies in the mapping.

Mount Terry Public School children help to replant a regional biodiversity corridor near Albion Park.

Lachlan Wilmott/OEH

2. Mapping criteria

Mapping criteria for developing BIO Map have been developed by OEH to provide a consistent, transparent and repeatable approach to the identification and mapping of PIAs. General criteria were prepared that guide the overall standard of data inputs and outputs. Specific criteria for core areas, state biodiversity corridors and regional biodiversity corridors were then defined. A table of all of the criteria is presented in Appendix 1: BIO Map Criteria, and the key points are summarised below.

2.1 General criteria

The general criteria focus on a number of overarching key principles, ensuring the use of best available input data and the production of a high-quality, regional product. The overall aim of the general criteria was to produce consistent and accurate mapping viewable at a property scale. Stakeholder consultation was identified as a key step in the mapping process to improve the reliability of the map.

As a result of the general criteria, the PIAs identified and mapped were required to:

- be mapped over all land tenures (although investment would be limited to only those tenures able to receive it)
- draw on existing data sources (where information was available and suitable); this information was to be compiled into a single investment priority layer
- exclude the identification of lands with current or known planned development, or areas where land was unlikely to be available or suitable for conservation
- not adversely affect development or land-use rights (priority investment information would be used to provide incentives to protect biodiversity)
- be mapped at a property scale by using vegetation or cadastral boundaries, or both
- be prepared with local knowledge and validation and significant stakeholder consultation
- be updated regularly in cases where new data or land-use changes significantly affected the PIAs identified.

The general criteria apply equally to the identification and mapping of core areas and state and regional biodiversity corridors; they reflect the lessons learned from previously completed mapping projects.

2.2 Core area criteria

Core areas are areas of native vegetation and habitat where management will be of greatest benefit to the conservation of state and regional biodiversity values within a region.

The criteria for mapping core areas under BIO Map are flexible to take into account data availability, land-use patterns and pressures, and areas considered in past studies to be of conservation value (Appendix 1: BIO Map Criteria). The criteria do not specifically define what values are to be represented within a core area; instead, they focus on allowing the definition of ‘key’ state and regional biodiversity values on a region-by-region basis.

New or existing data can be used to identify the key state and regional biodiversity values, which can include significant vegetation types or remnants, Threatened Ecological Communities, significant threatened species populations and habitat, and other state and regional biodiversity values such as ‘matters of national environmental significance’ (MNES), important wetlands, karst areas, old-growth forest, rainforest and areas listed by statutory

conservation or protection mechanisms. Depending on the type of feature being identified as a core area, a minimum patch size, fragmentation analysis or target may be applied to focus effort on the areas of highest importance. Conservation planning tools may be used to inform or supplement analyses completed within the study area.

Core area criteria should focus on viability and should include sites that have adequate size and connectivity to allow for protection and management in the long term. Sites with social value, where stakeholders can demonstrate an existing ongoing commitment, can also be considered for inclusion. In these cases the area must contain the key state or regional biodiversity values being targeted and must be of adequate condition, connectivity, patch size and viability.

2.3 State biodiversity corridor criteria

State biodiversity corridors are key linkages of native vegetation identified through state-wide analysis and provide connectivity between IBRA regions and subregions.

Biodiversity corridors exist at several scales within the landscape, from continent-scale corridors to local corridors allowing the movement of species over small distances. These corridors can consist of vegetation in good condition that connects habitat remnants (Drielsma et al. 2012), but they can also include areas where native vegetation is interspersed with areas of non-native vegetation, disconnected linear elements, or other isolated stepping-stone-type features, termed 'structural connectivity' (Doerr et al. 2010).

State biodiversity corridors provide connectivity between IBRA regions and subregions, and they must have been identified by a previous state-wide assessment of connectivity completed by OEH, such as through the NSW Native Vegetation Management Benefits project (Drielsma et al. 2012). BIO Map allows the validation of this state-wide information at the local scale: local and regional data sets such as vegetation maps, aerial photos, cadastral boundaries and other suitable data are used to improve the data's accuracy to a property scale.

2.4 Regional biodiversity corridor criteria

Regional biodiversity corridors are key linkages of native vegetation within an IBRA subregion, between IBRA subregions or between significant biodiversity features.

To be considered a regional biodiversity corridor, the corridor must provide a link between significant biodiversity features, such as:

- state biodiversity corridors
- mapped core areas
- large native vegetation remnants
- other significant areas, such as the coastline, NPWS reserves or important council or Crown reserves.

The corridors defined by the criteria include corridors of state and regional significance. Local corridors are not included in the criteria and were therefore not mapped as part of the BIO Map project; they remain the responsibility of local government and Local Land Services, through LEPs and other mechanisms. Local corridors are defined as linkages of native vegetation that either extend from a significant biodiversity feature into the surrounding landscape, or link local landscape features such as reserves, creek lines, gullies, wetlands and ridgelines (adapted from DEC 2004).

3. Method used to map PIAs in the Illawarra region

3.1 Use of existing data

Existing data held by a number of different organisations provided a significant resource for identifying PIAs within the Illawarra region. The existing mapping was used in one of two ways: the mapping was either incorporated into BIO Map to delineate PIA boundaries or used to inform the mapping of PIAs as a reference layer.

OEH contacted state and local government stakeholders, as well as community groups, during the project to obtain data related to the mapping of PIAs. Data requested included vegetation and threatened species maps, biodiversity strategies and overlays, LEP zones, land-use information, biodiversity priorities, corridor maps, and any other data that could help identify PIAs.

Many organisations were able to supply a range of data to help with the project (Appendix 2). Because of inconsistency of scale and purpose between the various data sets, most maps were not completely incorporated into BIO Map. Many, however, were used to validate or inform the PIAs identified and help improve the reliability of BIO Map across the study area.

Where data layers met the requirements of the criteria and were prepared for reasons similar to those of BIO Map they were incorporated into BIO Map. The following data sets were added, either entirely or partially, into the Illawarra study area BIO Map:

- state corridors identified as part of the Native Vegetation Management Benefits Analysis (Drielsma et al. 2012)
- regional corridors identified in the Illawarra Biodiversity Strategy (Wollongong City Council et al. 2011)
- areas ranked ‘Highest’ or ‘High’ in the Natural Areas Rehabilitation Priorities in the Illawarra Biodiversity Strategy (Wollongong City Council et al. 2011)
- land identified in the Wollongong, Shellharbour and Kiama LEPs as being of high biodiversity value.

The use of these existing data helped to ensure a high level of consistency with the priorities already identified within the study area through other projects. This consistency should reduce confusion between priority mapping outputs available within the region.

3.2 Development of new data

Although many data sets were available from stakeholders for the Illawarra region, several regional-scale data layers were required in order to map PIAs at an appropriate scale. The layers updated or created for the project are described below.

Vegetation

To identify core areas across the Illawarra, a consistent single layer of vegetation was needed for the subregion. This was created from 19 separate existing vegetation maps, plus a new map created by OEH for Killalea State Park. The key maps used to create the Illawarra study area vegetation map were:

- Native Vegetation of the Illawarra Escarpment and Coastal Plain (NPWS 2002, updated by Wollongong City Council 2014, VIS [Vegetation Information System] catalogue number 3778)
- Native vegetation of the Woronora, O’Hares and Metropolitan Catchments (NPWS 2003, VIS 2387)

- Native vegetation of the Sydney metropolitan area (OEH 2013, VIS 3817)
- Natural Vegetation of the Municipality of Kiama NSW (Mills 2006)
- Natural Vegetation in the City of Shellharbour (Mills 2001).

In addition to these, a number of recent small, finer scale maps were incorporated, such as those for Shellharbour Council reserves, Tallawarra development lands and NPWS reserves. A full list of the vegetation maps used is given in Appendix 2: Data sources and their application to BIO Map.

Killalea State Park was identified as likely being important to BIO Map but did not have an existing vegetation map of an appropriate scale. In partnership with the Killalea State Park Trust, OEH created a new map with fine-scale delineation of Threatened Ecological Communities (OEH 2014a). The Killalea State Park vegetation map was incorporated into the final Illawarra vegetation map used to identify core areas for BIO Map.

To create a single map for the Illawarra with a consistent vegetation classification in terms of Plant Community Type (PCT), a new analysis of systematic vegetation plots was run. This classification included 15 additional sites examined by a contracted botanist in under-sampled vegetation types throughout the study area. PCTs for the Southern Rivers and Hawkesbury-Nepean Catchment Management Authorities (CMAs; now replaced by Local Land Services Regions) were exported from the VIS (Vegetation Information System) Classification database. Map unit profiles for each of the source maps were reviewed and allocated to the best-fit PCT known from the study area. This review entailed a review of the floristics, habitat descriptors and floristic plot data, where available. 'Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands' (Tozer et al. 2010) was the source of the PCT units for the Illawarra BIO Map. Accordingly, vegetation community profiles from this study were reviewed to fully understand the PCTs and the floristic variability within them. The Illawarra BIO Map is mostly within the Southern Rivers CMA, so wherever possible PCT codes from this CMA were used.

The vegetation classification review also aligned vegetation types to Threatened Ecological Communities. Before this project, vegetation types had not been consistently aligned to Threatened Ecological Communities in the original maps, or there had been new listings of Threatened Ecological Communities since the maps had been made. Where the relationship between PCTs and Threatened Ecological Communities was not yet established, alignment was based on expert review of floristics and habitat descriptors. PCTs are often broader than Threatened Ecological Communities. Therefore, there may be several map units that have been allocated to the one PCT, with only a subset or single unit ascribed to the Threatened Ecological Community (Appendix 3: Relationship of Plant Community Types to Threatened Ecological Communities).

Maps were joined and edge-matched by using geographic information systems. In cases where two or more maps existed in an area, the finest-scale and most accurate map was used. The final layer provided seamless vegetation coverage of the Illawarra region. Vegetation was attributed to 39 different PCTs. This vegetation layer formed the basis of the analysis and PIA mapping completed for the project.

Land-use and zoning

Land-use and zoning layers were obtained from each of the three local government areas to help identify PIAs and avoid conflicts with land currently zoned or proposed to be zoned for residential, commercial or industrial development and infrastructure. The composite land-use and zoning layer was created from a number of sources and includes LEP zoning information, conservation areas such as the NPWS Estate, and the region's future housing hotspots and land-release sites, such as the West Dapto Urban Release Area.

The layer resulted in a seamless representation of known or planned land uses within the study area, including areas where a recent change in land zoning will lead to land-use intensification. The layer was used to identify areas of known current or future land use where the viability of PIAs will be reduced.

3.3 Applying the criteria: core areas

Identifying Threatened Ecological Communities

The new single-classification vegetation map was the main information source used to define core areas. The vegetation map identifies the distribution of 39 PCTs that occur in the region. Of these, 23 were identified as being wholly or partially aligned with one of 21 Threatened Ecological Communities that occur in the Illawarra (Appendix 3: Relationship of Plant Community Types to Threatened Ecological Communities).

A significant proportion of the habitat for threatened plant and animal species in the region is represented within Threatened Ecological Communities. As a result, threatened species populations and habitats were not specifically targeted during the preparation of the Illawarra BIO Map. Other programs, such as Saving Our Species, consider threatened species at a site level; these programs should be consulted in conjunction with BIO Map to identify specific sites associated with individual threatened species.

Core area representation targets

Conservation targets are often used when identifying high-priority biodiversity values that require protection or management. In the case of the Illawarra BIO Map, minimum representation targets were applied to ensure that each Threatened Ecological Community was, where possible, adequately represented in core areas. The representation target does not specify the amount of land to be conserved, protected or funded within the core areas.[2]

Often the Comprehensive, Adequate and Representative (CAR) criteria (Commonwealth of Australia 1997) are referenced when applying such targets. The CAR criteria reference the following targets:

- 15 per cent of the pre-1750 distribution of each forest ecosystem
- 60 per cent of the extant area of vulnerable ecosystems
- all remaining areas of rare or endangered ecosystems (Commonwealth of Australia 1997).

The CAR criteria provide guidance rather than mandatory targets and include flexibility to allow for regional variability and social and economic factors.

Many vegetation communities within the Illawarra region are cleared to substantially less than 15 per cent of their original extent. The study area is also highly fragmented, with ongoing land-use and clearing pressure, as well as high land values and management costs. The targets listed in the CAR criteria are therefore difficult to achieve.

In recognising the above pressures, a minimum representation target of 60 per cent of the existing area of each Threatened Ecological Community within core areas (or the NPWS Estate) was adopted for the Illawarra BIO Map.

It should be noted that the above target is for the sole purpose of prioritising investment and is not a vegetation retention target. Moreover, the target does not represent the only biodiversity values that warrant protection within a region.

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[2] The NPWS Estate can also contribute to the target for a key state or regional biodiversity value.

Mapping core areas

For the Illawarra BIO Map, core areas were defined as contiguous patches (separated by 30 metres or less) of Threatened Ecological Communities greater than 10 hectares in size. Threatened ecological communities were identified by mapping the associations of PCTs with the NSW Scientific Committee determinations of threatened communities.

Land was removed from core areas in cases where it was deemed likely to be affected by development; this included land zoned for urban land uses or areas where land-use intensification or fragmentation was likely. As a general rule, land zoned residential (e.g. R1 to R4 under a standard LEP, or equivalent), industrial (e.g. IN1 to IN4) or business (e.g. B1 to B7) was removed from core areas. Zoning data were obtained from LEPs in force throughout the study area.

After stakeholder consultation and feedback, these areas were then refined into fine-scale boundaries based on either property or vegetation boundaries. The boundaries identified focused on capturing entire patches of the vegetation type identified, not just the amount needed to meet the minimum representation target. Therefore, the areas of some vegetation types significantly exceeded their targets.

3.4 Applying the criteria: state and regional biodiversity corridors

Identifying state and regional biodiversity corridors

Corridors play a crucial role in maintaining connections between animal and plant populations that would otherwise be isolated and at greater risk of local extinction. The corridors identified for BIO Map include the best remnant canopy vegetation available to create multi-use connections between larger core habitat areas. The aim of identifying these general purpose corridors is to increase the mobility and range of a variety of species by preserving and providing habitat through which the species can move from one patch of vegetation to another. Connectivity corridors give species access to an increased range and supply of food, habitats, and breeding partners. Connecting remnants increases the practical size of each remnant by increasing the habitat options of individual species and the potential for exchange of genetic material, thus enhancing the viability of populations and communities.

As outlined in Priority Investment Areas, state biodiversity corridors must be identified through a state-wide analysis. There is one state biodiversity corridor that incorporates part of the Illawarra region. This state corridor was identified as part of the Native Vegetation Management Benefits Analysis (Drielsma et al. 2012) and covers only a very small proportion of the Woronora Plateau at its northern and southern extremes. These small areas are connected with, and overlapped by, the smaller regional biodiversity corridors, which are the primary instruments used to identify PIAs in the Illawarra.

The regional corridors used in the Illawarra BIO Map were taken directly from the Illawarra Biodiversity Strategy (Wollongong City Council et al. 2011). This ensures a high degree of consistency with the existing regional conservation plans. Many of the objectives for corridors from that strategy correspond to the intended uses under BIO Map, including:

- Delineate areas of high quality habitat.
- Conserve and protect areas of high-quality habitat.
- Enhance existing connectivity within corridors by regenerating or revegetating missing links where possible.
- Consolidate and manage these continuous links to provide large-scale connectivity through the landscape.

- Maintain viability of native vegetation and provide dispersal corridors for fauna.
- Minimise further clearing within these areas.

The representation of many Threatened Ecological Communities within PIAs was significantly increased through the inclusion of large areas of vegetation in the regional corridors. (See Table 2 in section 5.)

Marcus Burgess

Bush regenerators working at Frazer's Creek, Croom Road.

4. Stakeholder consultation

A stakeholder engagement strategy was prepared during the early stages of the project; it included a list of key stakeholders (Table 1). Stakeholders included eight state government departments, four local governments and six NGOs. The engagement purpose was 'to work with stakeholders to identify and promote PIAs for biodiversity management in the Illawarra'. Meetings were held with nine key stakeholders, including all identified as Tier 1 stakeholders. At these meetings, the BIO Map concept was discussed and the draft map presented. This yielded important information, which was taken into account in preparing the final map. Following the targeted meetings, a letter, fact sheet and copy of the draft map were sent to all identified stakeholders requesting feedback. A period of 2 months (January and February 2015) was provided for comments.

Table 1 Stakeholders consulted in the development of the Illawarra BIO Map.

Authority	Organisation	Consultation Type
State government	Crown Lands	Correspondence
State government	Department of Industry, Skills and Regional Development	Correspondence
State government	Department of Planning & Environment (Tier 1)	Meeting and correspondence
State government	Illawarra Local Aboriginal Land Council (Tier 1)	Meeting and correspondence
State government	Jerrinja Local Aboriginal Land Council	Correspondence
State government	National Parks and Wildlife Service (Tier 1)	Meeting and correspondence
State government	Roads and Maritime Services	Correspondence
State government	South East Local Land Services (Tier 1)	Meeting and correspondence
State government	NSW Water	Correspondence
Local government	Kiama Municipal Council (Tier 1)	Meeting and correspondence
Local government	Shellharbour City Council (Tier 1)	Meeting and correspondence
Local government	Shoalhaven City Council (Tier 1)	Meeting and correspondence
Local government	Southern Councils Group (Tier 1)	Meeting and correspondence
Local government	Wollongong City Council (Tier 1)	Meeting and correspondence
Environment group	Conservation Volunteers Australia	Correspondence
Environment group	Landcare Illawarra	Correspondence
Environment group	National Parks Association	Correspondence
Landholders	Boral Pty Ltd (Dunmore Sand and Soil)	Correspondence
Landholders	Cleary Bros	Correspondence
Landholders	Holcim Australia, Albion Park	Correspondence

Of the stakeholders consulted, nine provided positive and/or constructive feedback on the draft Illawarra BIO Map. Wollongong, Shellharbour and Kiama councils and one NGO either submitted suggestions for areas that they would like included or argued for a decrease in the size threshold for the delineation of core areas. The Department of Planning & Environment listed areas for additional scrutiny to ensure that the Illawarra BIO Map did not conflict with existing or proposed developments.

All comments were collated and reviewed. Suggestions for new inclusions were reviewed against the mapping criteria, including vegetation type, patch size, connectivity, land use, threatened species records and existing or planned conservation activities. As a result of the review, six patches of vegetation were either added or expanded for the final BIO Map. After careful consideration, the patch-size threshold was not decreased to below 10 hectares. This was because representation targets for all Threatened Ecological Communities had already been met, and lowering the threshold would have resulted in too significant a departure from the intention of BIO Map to delineate the most important areas at a regional scale.

5. Results

5.1 Overview

The final Illawarra BIO Map identifies a network of core areas and regional biodiversity corridors within the Illawarra region (Figure 2). The total area represented within the mapped PIAs is 74 672 hectares. Core areas include about 21% of the extant vegetation within the Illawarra region. However, once regional corridors are also included, 93% of extant vegetation is covered in the PIAs. This is mostly in the large, unbroken stretches of bushland in the NPWS and Water NSW Estate along and above the Illawarra escarpment. Outside these tenures, 29% of the extant vegetation is within core areas, with a further 53% covered once corridors are included. The total numbers of hectares within core areas and regional biodiversity corridors[3] are presented in Table 2.

Table 2 Total hectares of vegetation within core areas and regional biodiversity corridors

Priority Investment Area category	Extant vegetation (ha)	Cleared land (ha)	Priority Investment Areas total (ha)
Core areas	13 979	4	13 983
Regional biodiversity corridors	52 848	7842	60 689
Total (ha)	66 827	7846	74 672

Within the PIAs, 90% is covered by native vegetation (Table 2). Cleared areas that are included within the core areas or corridors are generally roads, small clearings, or small gaps in between large patches of remnant vegetation. These clearings are often where conservation investment could improve patch viability or connectivity.

The PIAs include 96% of the area of Threatened Ecological Communities in the Illawarra (Table 3). The core areas, which are defined as patches of Threatened Ecological Community greater than 10 hectares, include almost 84% of the total mapped occurrence of these threatened entities. Additional areas of Threatened Ecological Communities that are within mapped regional biodiversity corridors bring the total to 96%. For the lands outside the NPWS estate and the Water NSW drinking water catchments, where conservation investment will most likely be directed, these figures are 83% and 92%, respectively.

The proportion of Threatened Ecological Communities included in the PIAs is relatively high. This is driven by the unique topography of the region—particularly the extensive vegetated escarpment and plateau. These steep and undevelopable lands are wholly included within the identified regional biodiversity corridors (Wollongong City Council et al. 2011), and they account for the majority of hectares of Threatened Ecological Communities within the PIAs. In contrast, the vegetation communities of the coastal plain, such as Illawarra Lowlands Grassy Woodlands, are upwards of 70% cleared already. The PIAs capture 85% of remaining Illawarra Lowlands Grassy Woodlands—72% within 19 patches over 10 hectares identified as core areas. Not included in the PIAs are 314 small and isolated patches below the 10-hectare threshold and/or not in a regional corridor.

[3] For all statistics, if an area is classified as both a core area and a regional biodiversity corridor, then the area has been counted only towards core areas.

Table 3 Hectares of Threatened Ecological Communities (TECs) captured within core areas and total priority investment areas (PIAs) in the NPWS Estate, the Water NSW Estate, and all other tenures.

Tenure	TEC (ha)	TEC in core areas		TEC in PIAs (core areas plus corridors)	
		ha	%	ha	%
NPWS Estate	4122	3857	93.6	4114	99.8
Water NSW Special Areas	3427	2487	72.6	3427	100.0
Other	8743	7271	83.2	8021	91.7
Total Illawarra region	**16 292**	**13 614**	**83.6**	**15 562**	**95.5**

Marcus Burgess

Riparian revegetation at American Creek at Figtree in Wollongong LGA, within a regional biodiversity corridor

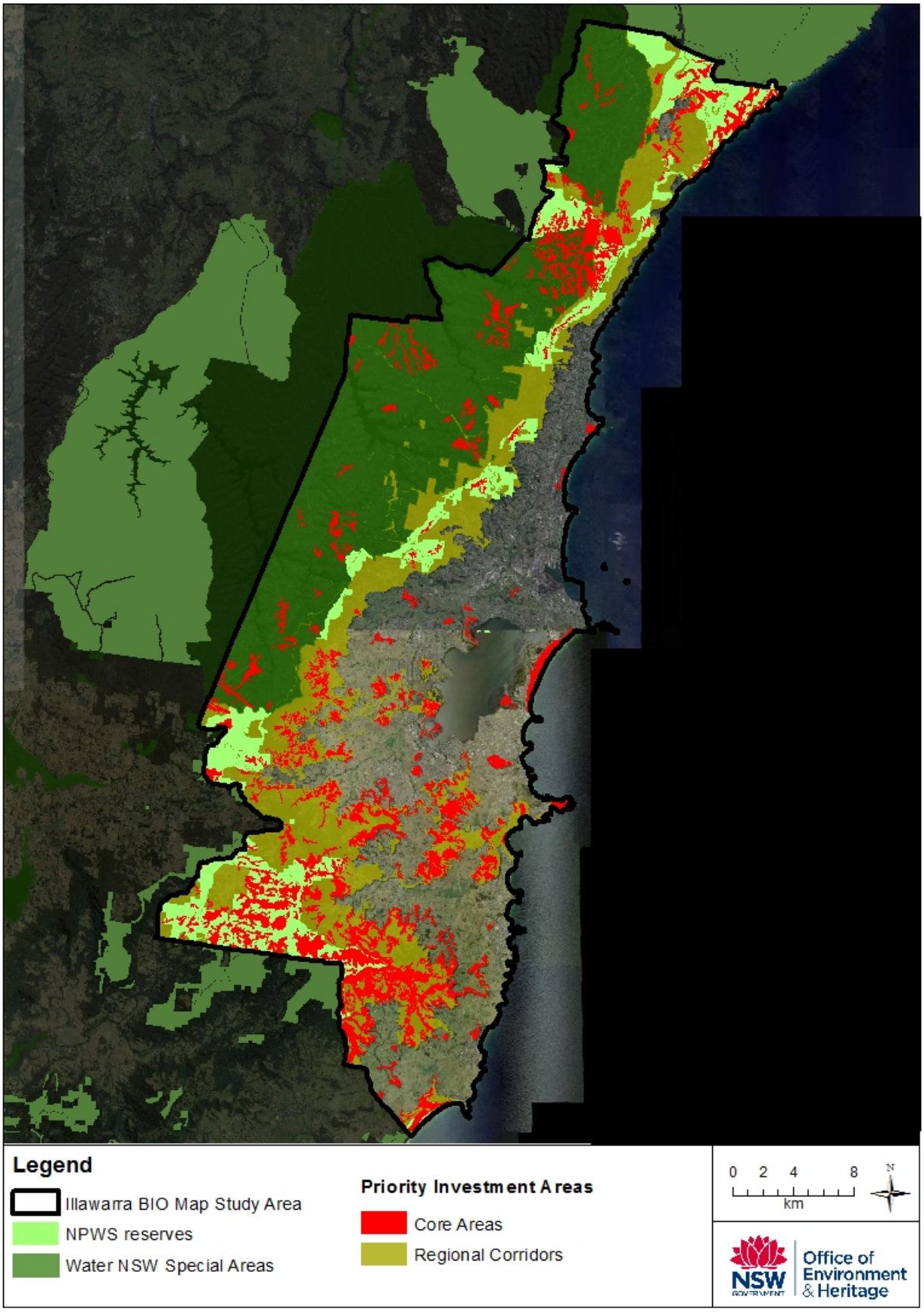

Figure 2 Illawarra BIO Map Priority Investment Areas

5.2 Key state and regional biodiversity values

All bar two of the 21 Threatened Ecological Communities identified in the Illawarra subregion exceeded the minimum 60% representation target within the core areas[4] (Table 4). The only communities that did not reach the target were Riverflat Eucalypt Forest and Sydney Freshwater Wetlands, both of which are naturally restricted communities within the Illawarra, with total mapped areas of only 43 (15 per cent within core) and 32 (54 per cent within core) hectares, respectively. However, once regional biodiversity corridors were added to the PIAs, the representation of these communities rose to meet the 60% target.

Ecological communities with the highest level of representation within the core areas tended to be those that occurred in the unbroken bushland of the Illawarra escarpment and the Woronora and Budderoo plateaus, such as Coastal Upland Swamp and Illawarra Subtropical Rainforest. The most poorly represented communities were those found on the fragmented and highly utilised coastal strip; they included Freshwater Wetlands on Coastal Floodplains and Illawarra Lowlands Grassy Woodlands.

Although not initially counted towards the minimum representation target, regional biodiversity corridors add a significant area of mapped vegetation to the PIAs. When these were included, all vegetation communities were represented at over 61 per cent within PIAs, and many were represented at 90 per cent or more (Table 4).

Table 5 shows the representation of each of the PCTs within the core areas and regional corridors. The relationship between PCTs and Threatened Ecological Communities is given in Appendix 3: Relationship of Plant Community Types to Threatened Ecological Communities.

Marcus Burgess

Restoration of Illawarra Subtropical Rainforest in the foothills of the Illawarra Escarpment at Jamberoo.

[4] The NPWS Estate can also contribute to the target for a key state or regional biodiversity value.

Table 4 Representation of Threatened Ecological Communities (TECs) in core areas and Priority Investment Areas (PIAs) (core areas plus regional corridors). NPWS, National Parks and Wildlife Service; SCA, Sydney Catchment Authority

TEC name	Total area (ha)	Area in NPWS Estate		Area in SCA Estate		Area outside SCA and NPWS Estate		Total area in core areas – ha (%)	Total area in PIAs (core areas plus regional biodiversity corridors) – ha (%)
		Core areas (ha)	Regional biodiversity corridors (ha)	Core areas (ha)	Regional biodiversity corridors (ha)	Core areas (ha)	Regional biodiversity corridors (ha)		
Bangalay Sand Forest	207.2	72.9	0.0	0.0	0.0	127.0	0.4	199.9 (96.5)	200.3 (96.6)
Coastal Saltmarsh	110.2	0.0	0.0	0.0	0.0	97.1	0.7	97.1 (88.1)	97.8 (88.8)
Coastal Upland Swamp	5511.0	2068.9	179.6	2161.9	884.0	164.9	51.8	4395.6 (79.8)	5511.0 (100)
Freshwater Wetlands on Coastal Floodplains	138.0	0.0	0.0	0.0	0.0	82.7	2.2	82.7 (60.0)	84.9 (61.5)
Illawarra Lowlands Grassy Woodland	1613.3	0.0	0.4	0.0	0.0	1164.2	209.0	1164.2 (72.2)	1373.6 (85.1)
Illawarra Subtropical Rainforest	5558.9	548.7	29.4	0.0	5.2	4487.8	288.1	5036.5 (90.6)	5359.3 (96.4)
Littoral Rainforest	196.1	129.7	1.5	0.0	0.0	29.4	11.7	159.1 (81.1)	172.3 (87.9)
Lowland Rainforest	298.1	195.3	26.5	0.0	0.0	12.6	63.6	207.9 (69.7)	298.1 (100)
Melaleuca armillaris Tall Shrubland	199.9	0.0	0.0	0.0	0.0	194.9	1.4	194.9 (97.5)	196.3 (98.2)
Montane Peatlands and Swamps	172.6	127.2	6.8	0.0	0.0	25.8	12.7	153.0 (88.7)	172.6 (100)
O'Hares Creek Shale Forest	228.1	11.0	0.8	129.5	30.0	41.5	15.3	182.0 (79.8)	228.1 (100)
River-Flat Eucalypt Forest	43.4	0.0	0.0	0.0	0.0	6.4	20.1	6.4 (14.7)	26.6 (61.1)
Robertson Basalt Tall Open Forest	26.7	26.7	0.0	0.0	0.0	0.0	0.0	26.7 (100)	26.7 (100)

TEC name	Total area (ha)	Area in NPWS Estate		Area in SCA Estate		Area outside SCA and NPWS Estate		Total area in core areas – ha (%)	Total area in PIAs (core areas plus regional biodiversity corridors) – ha (%)
		Core areas (ha)	Regional biodiversity corridors (ha)	Core areas (ha)	Regional biodiversity corridors (ha)	Core areas (ha)	Regional biodiversity corridors (ha)		
Robertson Rainforest	161.6	21.4	0.0	0.0	0.0	124.2	15.9	145.6 (90.1)	161.6 (100)
Shale/Sandstone Transition Forest	36.4	0.0	0.0	24.8	10.9	0.7	0.0	25.5 (70.2)	36.4 (100)
Southern Highlands Shale Woodlands	212.3	48.5	0.0	137.2	5.5	17.2	4.0	202.9 (95.6)	212.3 (100)
Southern Sydney Sheltered Forest	913.4	503.7	10.7	33.2	5.0	297.6	39.0	834.5 (91.4)	889.2 (97.3)
Swamp Oak Floodplain Forest	437.9	0.0	0.0	0.0	0.0	310.1	7.4	310.1 (70.8)	317.6 (72.5)
Swamp Sclerophyll Forest	78.4	0.1	0.0	0.0	0.0	65.9	0.0	66.0 (84.2)	66.0 (84.2)
Sydney Freshwater Wetlands	31.7	0.0	0.0	0.0	0.0	17.1	3.6	17.1 (53.9)	20.7 (65.2)
Themeda Grassland on Seacliffs and Headlands	117.0	102.9	1.7	0.0	0.0	3.5	2.7	106.4 (90.9)	110.8 (94.7)
Total	**16 292.2**	**3856.9**	**257.5**	**2486.6**	**940.5**	**7270.8**	**749.7**	**13 614.3 (83.6)**	**15 562.0 (95.5)**

Table 5 Representation of key state and regional biodiversity values in Priority Investment Areas (PIAs). NPWS, National Parks and Wildlife Service; PCT, Plant Community Type; SCA, Sydney Catchment Authority

PCT code	PCT name	Total area (ha)	Area in NPWS Estate		Area in SCA Estate		Area outside NPWS and SCA Estate		Total area in core areas – ha (%)	Total area in PIAs (core areas and regional biodiversity corridors) – ha (%)
			Core areas (ha)	Regional biodiversity corridors (ha)	Core areas (ha)	Regional biodiversity corridors (ha)	Core areas (ha)	Regional biodiversity corridors (ha)		
659	Bangalay – Old-man Banksia open forest on coastal sands, Sydney Basin Bioregion and South East Corner Bioregion	262.5	72.9	18.0	0.0	0.0	131.6	33.1	204.5 (77.9)	255.5 (97.3)
694	Blackbutt – Turpentine – Bangalay moist open forest on sheltered slopes and gullies, southern Sydney Basin Bioregion	2388.5	0.0	721.1	0.0	709.8	0.0	902.3	0.0 (0.0)	2333.2 (97.7)
720	Bracelet Honey-myrtle – Australian Indigo dry shrubland on volcanics, southern Sydney Basin Bioregion	199.9	0.0	0.0	0.0	0.0	194.9	1.4	194.9 (97.5)	196.3 (98.2)
743	Brown Barrel – Mountain Grey Gum tall moist forest on basalts of the Southern Highlands Bioregion and Sydney Basin Bioregion	876.4	21.9	322.5	0.0	0.0	0.0	394.2	21.9 (2.5)	738.6 (84.3)
771	Coast Banksia – Coast Tea-tree low moist forest on coastal sands and headlands, Sydney Basin Bioregion and South East Corner Bioregion	108.2	0.0	0.0	0.0	0.0	42.7	27.0	42.7 (39.5)	69.7 (64.4)
772	Coast Banksia – Coast Wattle dune scrub of the Sydney Basin Bioregion and South East Corner Bioregion	315.3	0.0	7.6	0.0	0.0	216.3	22.7	216.3 (68.6)	246.6 (78.2)
781	Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion	163.4	0.0	0.0	0.0	0.0	95.2	5.8	95.2 (58.3)	101.1 (61.9)

PCT code	PCT name	Total area (ha)	Area in NPWS Estate		Area in SCA Estate		Area outside NPWS and SCA Estate		Total area in core areas – ha (%)	Total area in PIAs (core areas and regional biodiversity corridors) – ha (%)
			Core areas (ha)	Regional biodiversity corridors (ha)	Core areas (ha)	Regional biodiversity corridors (ha)	Core areas (ha)	Regional biodiversity corridors (ha)		
838	Forest Red Gum – Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin Bioregion	1614.2	0.0	1.9	0.0	0.0	918.0	471.0	918.0 (56.9)	1390.9 (86.2)
878	Gully Gum – Sydney Peppermint – Yellow Stringybark moist open forest of coastal escarpments, southern Sydney Basin Bioregion	6280.4	0.0	1441.6	0.0	1837.1	0.0	2993.3	0.0 (0.0)	6271.9 (99.9)
881	Hairpin Banksia – *Kunzea ambigua* – *Allocasuarina distyla* heath on coastal sandstone plateaux, Sydney Basin Bioregion	32.2	0.0	16.3	0.0	13.2	0.0	2.7	0.0 (0.0)	32.2 (100)
882	Hairpin Banksia – Slender Tea-tree heath on coastal sandstone plateaux, Sydney Basin Bioregion	1940.6	0.0	274.9	0.0	1445.4	0.0	217.2	0.0 (0.0)	1937.5 (99.8)
898	Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion	150.5	102.9	20.8	0.0	0.0	3.5	12.4	106.4 (70.7)	139.6 (92.7)
905	Lilly Pilly – Coachwood warm temperate rainforest on moist sheltered slopes and gullies, Sydney Basin Bioregion and South East Corner Bioregion	3605.1	104.2	1131.7	0.0	994.0	24.5	1343.4	128.7 (3.6)	3597.7 (99.8)
906	Lilly Pilly – Sassafras – Stinging Tree subtropical/warm temperate rainforest on moist fertile lowlands, southern Sydney Basin Bioregion	698.5	397.4	34.6	0.0	5.2	170.5	89.4	567.9 (81.3)	697.1 (99.8)

PCT code	PCT name	Total area (ha)	Area in NPWS Estate		Area in SCA Estate		Area outside NPWS and SCA Estate		Total area in core areas – ha (%)	Total area in PIAs (core areas and regional biodiversity corridors) – ha (%)
			Core areas (ha)	Regional biodiversity corridors (ha)	Core areas (ha)	Regional biodiversity corridors (ha)	Core areas (ha)	Regional biodiversity corridors (ha)		
910	Lilly Pilly littoral rainforest of the southern Sydney Basin Bioregion and South East Corner Bioregion	202.5	129.7	1.5	0.0	0.0	35.7	11.7	165.4 (81.7)	178.6 (88.2)
920	Mangrove forest in estuaries of the Sydney Basin Bioregion and South East Corner Bioregion	88.4	0.0	0.0	0.0	0.0	0.9	86.8	0.9 (1.0)	87.6 (99.1)
978	Needlebush – banksia wet heath on sandstone plateaux of the Sydney Basin Bioregion	5671.4	2184.5	186.4	2161.9	884.0	189.9	64.5	4536.3 (80.0)	5671.4 (100)
1081	Red Bloodwood – Grey Gum woodland on the edges of the Cumberland Plain, Sydney Basin Bioregion	53.2	0.0	13.0	0.0	0.0	0.0	40.2	0.0 (0.0)	53.2 (100)
1083	Red Bloodwood – scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion	14 465.4	0.0	1402.4	0.0	11996.7	0.0	1061.7	0.0 (0.0)	14 461.0 (99.9)
1085	Red Bloodwood – Smooth-barked Apple shrubby forest on shale or ironstone of coastal plateaux, Sydney Basin Bioregion	3.1	0.0	0.0	0.0	0.0	0.0	3.1	0.0 (0.0)	3.1 (100)
1105	River Oak open forest of major streams, Sydney Basin Bioregion and South East Corner Bioregion	220.4	0.0	0.8	0.0	0.0	10.9	87.4	10.9 (4.9)	99.1 (45)
1126	Saltmarsh in estuaries of the Sydney Basin Bioregion and South East Corner Bioregion	124.6	0.0	0.0	0.0	0.0	97.5	0.9	97.5 (78.2)	98.3 (78.9)

PCT code	PCT name	Total area (ha)	Area in NPWS Estate		Area in SCA Estate		Area outside NPWS and SCA Estate		Total area in core areas – ha (%)	Total area in PIAs (core areas and regional biodiversity corridors) – ha (%)
			Core areas (ha)	Regional biodiversity corridors (ha)	Core areas (ha)	Regional biodiversity corridors (ha)	Core areas (ha)	Regional biodiversity corridors (ha)		
1129	Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion	200.1	21.4	0.0	0.0	0.0	124.2	15.9	145.6 (72.8)	161.6 (80.7)
1149	Silvertop Ash – Blue-leaved Stringybark shrubby open forest on hinterland hills, far southern South East Corner Bioregion	8.1	0.0	0.0	0.0	0.0	0.0	8.1	0.0 (0.0)	8.1 (100)
1156	Silvertop Ash – Red Bloodwood – Sydney Peppermint heathy open forest on moist sandstone plateaux, southern Sydney Basin Bioregion	8256.3	19.6	2254.8	0.0	5375.3	15.9	451.6	35.5 (0.4)	8117.2 (98.3)
1181	Smooth-barked Apple – Red Bloodwood – Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion	921.1	503.7	10.7	33.2	12.7	297.6	39.0	834.5 (90.6)	896.8 (97.4)
1204	Spinifex beach strand grassland, Sydney Basin Bioregion and South East Corner Bioregion	38.2	0.0	0.0	0.0	0.0	3.6	8.2	3.6 (9.4)	11.8 (30.9)
1231	Swamp Mahogany swamp sclerophyll forest on coastal lowlands of the Sydney Basin Bioregion and South East Corner Bioregion	77.3	0.1	0.0	0.0	0.0	63.3	0.0	63.4 (82.0)	63.4 (82.0)
1232	Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion	427.7	0.0	0.0	0.0	0.0	303.6	7.0	303.6 (71.0)	310.6 (72.6)

PCT code	PCT name	Total area (ha)	Area in NPWS Estate		Area in SCA Estate		Area outside NPWS and SCA Estate		Total area in core areas – ha (%)	Total area in PIAs (core areas and regional biodiversity corridors) – ha (%)
			Core areas (ha)	Regional biodiversity corridors (ha)	Core areas (ha)	Regional biodiversity corridors (ha)	Core areas (ha)	Regional biodiversity corridors (ha)		
1234	Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion	15.1	0.0	0.0	0.0	0.0	6.1	0.5	6.1 (40.7)	6.6 (43.8)
1236	Swamp Paperbark – Swamp Oak tall shrubland on estuarine flats, Sydney Basin Bioregion and South East Corner Bioregion	6.3	0.0	0.0	0.0	0.0	3.1	0.0	3.1 (49.8)	3.1 (49.8)
1245	Sydney Blue Gum x Bangalay – Lilly Pilly moist forest in gullies and on sheltered slopes, southern Sydney Basin Bioregion	6460.0	0.0	1006.3	0.0	1938.3	148.0	2930.7	148.0 (2.3)	6023.3 (93.2)
1250	Sydney Peppermint – Smooth-barked Apple – Red Bloodwood shrubby open forest on slopes of moist sandstone gullies, eastern Sydney Basin Bioregion	2656.3	0.0	641.2	0.0	1679.6	0.0	334.6	0.0 (0.0)	2655.4 (100)
1253	Sydney Peppermint – White Stringybark – Smooth-barked Apple forest on shale outcrops, Sydney Basin Bioregion (Hawkesbury Nepean PCT – not in SR)	228.1	11.0	0.8	129.5	30.0	41.5	15.3	182.0 (79.8)	228.1 (100)
1254	Sydney Peppermint – White Stringybark moist shrubby forest on elevated ridges, Sydney Basin Bioregion	293.2	46.2	0.0	137.2	5.5	1.9	4.0	185.3 (63.2)	194. (66.4)
1292	Water Gum – Coachwood riparian scrub along sandstone streams, Sydney Basin Bioregion	44.0	0.0	19.5	0.0	17.5	0.0	6.9	0.0 (0.0)	44.0 (100)

PCT code	PCT name	Total area (ha)	Area in NPWS Estate		Area in SCA Estate		Area outside NPWS and SCA Estate		Total area in core areas – ha (%)	Total area in PIAs (core areas and regional biodiversity corridors) – ha (%)
			Core areas (ha)	Regional biodiversity corridors (ha)	Core areas (ha)	Regional biodiversity corridors (ha)	Core areas (ha)	Regional biodiversity corridors (ha)		
1300	Whalebone Tree – Native Quince dry subtropical rainforest on dry fertile slopes, southern Sydney Basin Bioregion	5282.2	241.7	30.0	0.0	0.0	4226.3	557.1	4468.0 (84.6)	5055.2 (95.7)
1326	Woollybutt – White Stringybark – Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion	430.3	0.0	0.0	0.0	0.0	244.3	98.2	244.3 (56.8)	342.5 (79.6)
1395	Narrow-leaved Ironbark – Broad-leaved Ironbark – Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin Bioregion	36.4	0.0	0.0	24.8	10.9	0.7	0.0	25.5 (70.2)	36.4 (100)

5.3 Recommended use of BIO Map data

BIO Map provides a single, accessible map that identifies the best areas for strategic investment in biodiversity management in the Illawarra region.

Federal, state and local governments regularly make funding available to support biodiversity management actions through various grant programs and are committed to ensuring that these funds are spent in an effective and accountable way. Identifying priority areas for biodiversity investment is one way of ensuring that, on the basis of an assessment of broad-scale biodiversity and stakeholder values, funds are targeted to areas of greatest strategic benefit.

BIO Map can be used in two ways. First, it can be used to inform funding bodies of the preferred locations at which to invest funds from grant programs. Second, it can provide useful information for landowners and land managers on the areas that have increased potential of receiving biodiversity management funds. BIO Map may thus increase the opportunities for landowners with property that falls within PIAs to receive funding to protect their bushland.

A landowner's right to carry out activities such as agriculture and development is not altered by their property being identified within a PIA. Areas within PIAs may have environmental values that may need to be considered as part of statutory planning and development approval processes; these areas would thus require an appropriately scaled level of environmental assessment as specified by the relevant planning or consent authority. If a property is within a PIA, then the landowner may have increased opportunities to access a range of conservation funding programs. Participation in these programs is entirely voluntary.

5.4 A decision-support tool for grant providers

BIO Map is a decision-support tool and provides guidance on PIAs. By investing in PIAs, fund managers can be confident that they are contributing to strategic conservation outcomes that have broad-based stakeholder support.

BIO Map can be used in different ways, depending on the objectives of the grant funding program. For example, a program may target only biodiversity core areas or only corridors within the project area. Programs targeted toward specific features or landscape units can use BIO Map as an initial filter to target areas for investigation.

OEH recommends that program funding be preferentially targeted to land that is within, or partially within, the PIAs. Methods to achieve this include:

- using a governance framework in which program funds must be spent within priority areas as a first preference before land in other areas or at lower priorities is considered. Criteria can then be used to further prioritise land within the priority areas. The western Sydney Growth Centres Biodiversity Offset Program is an example of this approach.
- applying a weighting (e.g. 10 per cent to 25 per cent) to grant applications that are located within, or partially within, a PIA. This enables applications outside the priority areas to also be competitive if they provide other benefits.

As would be expected, a grant program would need to undertake site-based assessments to ensure that the land has the specific features that are targeted for funding.

5.5 Supporting Local Land Services programs

Local Land Services identifies regional and local priorities in its Catchment Action Plans to guide its expenditure of funds. In some circumstances, the locations identified in a

Catchment Action Plan may differ from those identified in BIO Map because of differences in mapping approaches and objectives.

Depending on the purpose of the funding stream, Local Land Services is encouraged to consider the PIAs identified by BIO Map when allocating its funds. This may include initial prioritising of fund allocation to areas where BIO Map overlaps with the Catchment Action Plan priorities, before considering investment in other areas.

However, Local Land Services may have funding purposes that differ from those identified by BIO Map, or it may be able to achieve positive biodiversity outcomes outside the mapped PIAs.

5.6 Supporting local government programs

Consultation with councils has identified the benefits of a strategic, regional context of biodiversity priorities to support local biodiversity management planning and prioritisation. BIO Map is a resource that supports the establishment of local priorities by councils.

Councils are able to build on the identified PIAs within their LGAs, enhancing the networks of core areas and corridors identified by adding lands of local biodiversity importance, such as local corridors, in their council areas. PIAs may also help local government to prepare local documents such as biodiversity strategies or to prioritise efforts in applying for grant funding.

Council can use BIO Map information to determine whether any council-owned sites are identified as PIAs, thus increasing the potential to receive funding to manage or conserve these areas. Councils may also wish to prioritise PIAs when spending their own funds in situations where local and regional priorities are aligned.

5.7 Supporting community organisations and projects

BIO Map provides community groups and non-government organisations with information on biodiversity investment priorities; this information can help to select sites where it is appropriate to expend effort. As PIAs have an increased chance of receiving funding, and contribute to a wider network of biodiversity conservation, community groups can choose to focus on these areas when considering applications for grant funding or other funding. This may be particularly relevant to new groups, or to existing groups looking for new sites or opportunities.

BIO Map does not identify all areas of state or regional priority; nor does it identify areas of local value. Groups working outside identified PIAs continue to provide positive benefits for biodiversity within the study area.

Jedda Lemmon

Illawarra Lowlands Grassy Woodlands within a BIO Map core area at Yallah TAFE

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Appendix 1: BIO Map Criteria

Criterion type: Mapping standards

***Criteria**: Consistent mapping at a property scale*

Mapping guide:

1. Priority Investment Areas can be mapped over all land tenures, but investment will be limited to only those tenures able to receive it.
   - *Existing offsets are generally not available to receive grant funding, but they are often part of key corridors or part of larger core areas. Although these areas will be mapped as PIAs, they will not be available to receive funding and will be identified by a separate layer in the Biodiversity Investment Spatial Viewer (BISV).*
2. Priority Investment Areas are to exclude, where feasible, areas that are likely to be affected by development.
   - *Areas likely to be affected by development include land zoned for urban uses or areas where land-use intensification or fragmentation is likely. As a general rule, land zoned residential (e.g. R1 to R4 under a standard LEP, or equivalent), industrial (e.g. IN1 to IN4 under a standard LEP, or equivalent) or business (e.g. B1 to B7 under a standard LEP, or equivalent) is to be excluded from PIAs.*
3. Priority Investment Areas are to be delineated by using the best available regional information.
   - *Best available information includes the most comprehensive regional-scale vegetation mapping, vegetation classification and land-use information at the time of map production.*
4. Priority Investment Areas are mapped in vector format, validated by using recent aerial photography (less than 10 years old) and mapped at a 'property' scale (~1:10 000 to 1:20 000).
   - *Property scale mapping will help end-users determine whether their study areas are located within a Priority Investment Area.*
5. The boundaries of Priority Investment Areas should generally be aligned with either extant vegetation or cadastral boundaries.
6. Priority Investment Areas are to include predominantly vegetated lands.
   - *PIAs may include cleared land incidentally or as areas of potential connectivity value.*
7. Priority Investment Areas may be considered as both core areas and biodiversity corridors. In these circumstances, land is to be identified as both a core area and biodiversity corridor.
8. Priority Investment Areas will include only those mapping products that have been either publicly released or, if not publicly released, have been prepared in consultation with stakeholders.
   - *If the mapping is not publicly released, stakeholders to be consulted may include (for instance) local council staff, Department of Planning and Environment, Office of Strategic Lands, Department of Premier and Cabinet, Local Aboriginal Land Councils, Local Land Services, non-government organisations such as community and environment groups, and known local experts.*

Criterion type: Core areas

***Criteria**: Core areas of native vegetation and habitat where management will contribute the greatest benefit to the conservation of state and regional biodiversity values within a region*

Mapping guide:

1. Based on existing mapping OR through regional analysis assisted by conservation planning/decision support tools, such as the Biodiversity Forecasting Tool (BFT), patch size or fragmentation analysis, or alternative approach dependant on the data available within the study area.
2. Core areas are to be mapped by initially defining 'key' state and regional biodiversity values for the study area or region. Key biodiversity values may include **significant vegetation types** (such as state and Commonwealth Threatened Ecological Communities, under-reserved vegetation types, over-cleared vegetation types, vegetation types present in over-cleared landscapes and endemic vegetation communities), **significant vegetation remnants**, **significant threatened flora populations and fauna habitat**, and **other state and regional biodiversity values** such as 'matters of national environmental significance' (MNES), important wetlands, habitat for endemic species, karst areas, old-growth forest, rainforest and areas listed by statutory conservation or protection mechanisms.
   - *The selection of 'key' biodiversity values is to include consideration of potential future offset requirements in the region.*
3. The following guidelines are to be considered when mapping core areas:
   a. For **significant vegetation types**, a target in the order of 20% to 50% (to be determined regionally) of the existing area of each vegetation type should be used to guide decisions related to the amount of vegetation to be included as a core area.
      - *This target is for the sole purpose of prioritising investment and is not a vegetation retention target. The*

Criterion type: Core areas

target does not represent the only biodiversity values that warrant protection in a region.

- *The target range listed above is a guide and may require regional variation. Targets applied will be developed in consultation with stakeholders and with OEH oversight to ensure consistency across subregions.*
- *Areas in conservation reserves are counted towards the minimum target for each significant vegetation type.*

b. For **significant vegetation remnants**,[5] core areas may comprise large vegetated areas that are significant in the landscape, including non-threatened vegetation communities or important habitat for non-threatened fauna which rely on large, intact patches.

c. For **significant threatened flora populations and fauna habitat**, core areas can comprise significant populations of threatened species within the subregion.

d. For **other state and regional biodiversity values** (such as MNES, important wetlands, habitat for endemic species, karst areas, old-growth forest, rainforest and areas listed by statutory conservation or protection mechanism), no minimum areas apply.

4. In addressing 3, consideration is to be given to;

   a. Areas where biodiversity values are likely to be viable in the long term. Preference is to be given to vegetation in large, well-configured patches, with good condition and connectivity. Consideration should also be given to selecting areas that are representative of the diversity across the region.

   b. Areas of high social value as identified by local councils, residents and community groups that can demonstrate ongoing involvement in the biodiversity management of a site. Where an area is considered for inclusion because of social values the area must contain key state or regional biodiversity values and must meet minimum standards for condition, connectivity, patch size and viability etc.

5. Core areas are to exclude, where feasible, areas that are likely to be affected by development

   - *Areas likely to be affected by development include land zoned for urban uses or areas where land-use intensification or fragmentation is likely. As a general rule, land zoned residential (e.g. R1 to R4 under a standard LEP, or equivalent), industrial (e.g. IN1 to IN4 under a standard LEP, or equivalent) or business (e.g. B1 to B7 under a standard LEP, or equivalent)) is to be excluded from PIAs.*

Criterion type: State biodiversity corridors

Criteria: *State biodiversity corridors are key linkages of native vegetation identified through state-wide analysis and provide connectivity between IBRA regions and subregions.*

Mapping guide:

1. State biodiversity corridors are identified in the Native Vegetation Management Benefits map (Drielsma et al. 2012) as the top 10% of benefits from the 'consolidate' layer, or otherwise meet the definition above AND ARE
2. Validated using regional data and information in order to refine the boundaries mapped at a state scale.
   - *It is recognised that the validation process may result in a new corridor route being selected that achieves the same linkage benefit as the corridor mapped at the state scale. This new route will take into account fine-scale data that identify native vegetation cover.*
3. State biodiversity corridors are to exclude, where feasible, areas that are likely to be affected by development.
   - *Areas likely to be affected by development include land zoned for urban uses or areas where land-use intensification or fragmentation is likely. As a general rule, land zoned residential (e.g. R1 to R4 under a standard LEP, or equivalent), industrial (e.g. IN1 to IN4 under a standard LEP, or equivalent) or business (e.g. B1 to B7 under a standard LEP, or equivalent) is to be excluded from PIAs.*
4. Corridors generally have a minimum width of 100 metres; however, in some over-cleared landscapes this may not always be achievable. Similarly, in some landscapes with more extensive areas of contiguous vegetation a far greater width (i.e. several kilometres) may be appropriate.
5. Corridors generally comprise continuous native vegetation cover; however, most corridors will contain some discontinuities for roads or other purposes. As a general guide, discontinuities are to be less than 100 metres wide, noting that greater discontinuities may be required for some fragmented landscapes or key linkages.
6. In areas of contiguous vegetation, corridors may include entire vegetated areas, or parts of these vegetated areas that have particular vegetation types or landscape features (e.g. escarpment, rainforest or riparian corridors).

[5] Refer to Tables 20, 23 and 31 in the *BioBanking Assessment Methodology* (OEH 2014b) for guidance on defining patch size class by Mitchell Landscape; see Appendix 4 of the Methodology.

Criterion type: Regional biodiversity corridors

Criteria: *Regional biodiversity corridors are key linkages of native vegetation within an IBRA subregion, between IBRA subregions or between significant biodiversity features*

Mapping guide:

1. Regional biodiversity corridors provide linkages between significant biodiversity features within an IBRA sub-region, including:
   a. State biodiversity corridors;
   b. Mapped core areas;
   c. Large native vegetation remnants[6]; or,
   d. Other significant areas, such as the coastline, NPWS Estate or important council or Crown reserves.
2. Regional biodiversity corridors generally do not extend between several IBRA subregions, but they may cross between two subregions.
3. Regional biodiversity corridors do not include state biodiversity corridors (as defined above) or local corridors.
   - *Local corridors are linkages of native vegetation that either extend from a significant biodiversity feature into the surrounding landscape or link local landscape features such as reserves, creek lines, gullies, wetlands and ridgelines (adapted from DEC 2004).*
4. Regional biodiversity corridors include consideration of areas of high social value as identified by local councils, residents and community groups that can demonstrate ongoing involvement in the biodiversity management of a site. Where an area is considered for inclusion because of social values, the area must meet minimum standards for connectivity under item 1 above.
5. Regional biodiversity corridors are to exclude, where feasible, areas that are likely to be affected by development:
   - *Areas likely to be affected by development include land zoned for urban uses or areas where land-use intensification or fragmentation is likely. As a general rule, land zoned residential (e.g. R1 to R4 under a standard LEP, or equivalent), industrial (e.g. IN1 to IN4 under a standard LEP, or equivalent) or business (e.g. B1 to B7 under a standard LEP, or equivalent) is to be excluded from PIAs.*
6. Corridors generally have a minimum width of 100 metres; however, in some over-cleared landscapes this may not always be achievable. Similarly, in some landscapes with more extensive areas of contiguous vegetation a far greater width (i.e. several kilometres) may be appropriate.
7. Corridors generally comprise continuous native vegetation cover; however, most corridors will contain some discontinuities for roads or other purposes. As a general guide, discontinuities are to be less than 100 metres wide, noting that greater discontinuities may be required for some fragmented landscapes or key linkages.
8. In areas of contiguous vegetation, corridors may include entire vegetated areas, or parts of these vegetated areas that have particular vegetation types or landscape features (e.g. escarpment, rainforest or riparian corridors).

[6] Refer to Tables 20, 23 and 31 in the *BioBanking Assessment Methodology* (OEH 2014) for guidance on defining patch size class by Mitchell Landscape; see Appendix 4 of the Methodology.

Appendix 2: Data sources and their application to BIO Map

Data custodian	Data layer provided	Use in mapping (assist/partially incorporated/completely incorporated)
Crown Lands	Native Vegetation of Killalea State Park	Completely incorporated
Department of Planning & Environment	Standard Instrument LEP Zoning	Completely incorporated
	Standard Lot Size	Assist
Energy Australia	Vegetation of the Tallawarra Lands	Assist
Great Eastern Ranges Initiative	Illawarra Shoalhaven Priority Focus Corridors	Assist
	Great Eastern Ranges Statewide Corridors	Assist
Illawarra Bird Observers	Threatened Species Records	Assist
Lake Illawarra Authority	Vegetation of Lake Illawarra	Completely incorporated
Land and Property Information	Cadastre	Assist
	Local Government Areas	Assist
Southern Rivers CMA	Potential Priority Habitat (Catchment Action Plan)	Assist
NSW Office of Environment and Heritage	BioBank Agreements	Assist
	Flying-fox camp sites	Assist
	National Parks Estate	Assist
	Native Vegetation of the Sydney Metropolitan Area	Partially incorporated
	Native Vegetation of the Woronora, O'Hares and Metropolitan Special Areas	Partially incorporated
	Saving Our Species site-managed species sites	Assist
	Soil landscapes	Assist
	Threatened Species locations	Assist
	Native vegetation of South East NSW	Partially incorporated
	Terrestrial Vertebrate Fauna of the Greater Southern Sydney Region	Assist
Water NSW	Hydrolines and watercourses	Assist
	Sydney Catchment Authority Tenure	Assist
Kiama, Shellharbour and Wollongong councils	Illawarra Biodiversity Strategy Regional Biodiversity Corridors	Completely incorporated
	Illawarra Biodiversity Strategy Ranking of Council Reserves	Assist
	Illawarra Biodiversity Strategy Natural Rehabilitation Priorities	Assist
Kiama Municipal Council	Kaleula Headland Vegetation Survey	Completely incorporated
	Minnamurra Headland Vegetation Survey	Completely incorporated
	Terrestrial Biodiversity Map	Assist

Data custodian	Data layer provided	Use in mapping (assist/partially incorporated/completely incorporated)
Shellharbour City Council	Vegetation of Abercrombie Council Reserve	Completely incorporated
	Vegetation of Alex Hoffman Council Reserve	Completely incorporated
	Vegetation of Bass Point Council Reserve	Completely incorporated
	Vegetation of Blackbutt Council Reserve	Completely incorporated
	Vegetation of Croom Council Reserve	Completely incorporated
	Vegetation of Currumbene Parkway Council Reserve	Completely incorporated
	Vegetation of Elizabeth Brownlee Council Reserve	Completely incorporated
	Vegetation of Hargraves Ave Council Reserve	Completely incorporated
	Vegetation of Light Railway Museum Council Reserve	Completely incorporated
	Vegetation of Shell Cove Council Reserve	Completely incorporated
	Vegetation of Stony Range Council Reserve	Completely incorporated
	Vegetation of Stony Range South Council Reserve	Completely incorporated
	Blackbutt Reserve, Bushfire Management Plan	Assist
	Terrestrial Biodiversity Map	Assist
Wollongong City Council	Native Vegetation of the Illawarra Escarpment and Coastal Plain	Partially incorporated
	West Dapto Urban Release Vegetation Mapping	Assist

Appendix 3: Relationship of Plant Community Types to Threatened Ecological Communities

PCT	Plant Community Type name	Threatened Ecological Communities (NSW *Threatened Species Conservation Act*)
659	Bangalay – Old-man Banksia open forest on coastal sands, Sydney Basin Bioregion and South East Corner Bioregion	Bangalay Sand Forest
720	Bracelet Honey-myrtle – Australian Indigo dry shrubland on volcanics, southern Sydney Basin Bioregion	*Melaleuca armillaris* Tall Shrubland
743	Brown Barrel – Mountain Grey Gum tall moist forest on basalts of the Southern Highlands Bioregion and Sydney Basin Bioregion	Robertson Basalt Tall Open Forest
781	Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion	Freshwater Wetlands on Coastal Floodplains Sydney Freshwater Wetlands
838	Forest Red Gum - Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin Bioregion	Illawarra Lowlands Grassy Woodlands
898	Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion	*Themeda* Grassland on Seacliffs and Headlands
906	Lilly Pilly – Sassafras – Stinging Tree subtropical/warm temperate rainforest on moist fertile lowlands, southern Sydney Basin Bioregion	Illawarra Subtropical Rainforest Lowland Rainforest
910	Lilly Pilly littoral rainforest of the southern Sydney Basin Bioregion and South East Corner Bioregion	Littoral Rainforest
978	Needlebush – Banksia wet heath on sandstone plateaux of the Sydney Basin Bioregion	Coastal Upland Swamp Montane Peatlands and Swamps
1126	Saltmarsh in estuaries of the Sydney Basin Bioregion and South East Corner Bioregion	Coastal Saltmarsh
1129	Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion	Robertson Rainforest
1181	Smooth-barked Apple – Red Bloodwood – Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion	Southern Sydney Sheltered Forest
1231	Swamp Mahogany swamp sclerophyll forest on coastal lowlands of the Sydney Basin Bioregion and South East Corner Bioregion	Swamp Sclerophyll Forest
1232	Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion	Swamp Oak Floodplain Forest

PCT	Plant Community Type name	Threatened Ecological Communities (NSW *Threatened Species Conservation Act*)
1234	Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion	Swamp Oak Floodplain Forest
1236	Swamp Paperbark – Swamp Oak tall shrubland on estuarine flats, Sydney Basin Bioregion and South East Corner Bioregion	Swamp Sclerophyll Forest
1245	Sydney Blue Gum x Bangalay – Lilly Pilly moist forest in gullies and on sheltered slopes, southern Sydney Basin Bioregion	River-Flat Eucalypt Forest
1253	Sydney Peppermint – White Stringybark – Smooth-barked Apple forest on shale outcrops, Sydney Basin Bioregion (Hawkesbury Nepean PCT – not in SR)	O'Hares Creek Shale Forest
1254	Sydney Peppermint – White Stringybark moist shrubby forest on elevated ridges, Sydney Basin Bioregion	Southern Highlands Shale Woodlands
1300	Whalebone Tree – Native Quince dry subtropical rainforest on dry fertile slopes, southern Sydney Basin Bioregion	Illawarra Subtropical Rainforest
1326	Woollybutt – White Stringybark – Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion	Illawarra Lowlands Grassy Woodlands
1395	Narrow-leaved Ironbark – Broad-leaved Ironbark – Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin Bioregion	Shale/Sandstone Transition Forest

PCT, Plant Community Type