



International Journal of Heritage and Sustainable Development

Vol. 1, No. 1, June 2011, pp. 72-83

Historic and Environmental Significance of Ecological Communities in NSW, Australia

Pam Hazelton

Faculty of Engineering, University of Technology, Australia

Pam.Hazelton@uts.edu.au

Anne Clements

Anne Clements and Associates Environmental Consultants

Colonisation in the late 18th century and subsequent settlement in New South Wales, Australia has led to the native vegetation on the more arable soils being cleared, leaving only scattered remnants of the original vegetation. These vegetation remnants have become of natural heritage significance and are now protected under State and National legislation. Vegetation communities on sandstone-derived soils, not suitable for agriculture, have also been reserved in National Parks since the 1890s. The case studies of saltmarsh restoration and the planning of three cities illustrate that legal recognition of the natural heritage value of the remnant vegetation contributes to improved ecologically sustainable outcomes. The presence of a listed vulnerable saltmarsh species *Wilsonia backhousei* led to the restoration of the degraded saltmarsh community in an urban redevelopment. The identification of corridors of conservation and heritage significance are central issues for the development of Appin-Wilton and of Spring Farm, part of the planned three cities. The case studies show the historic loss of environmental heritage vegetation and the implementation of conservation planning to accommodate the expanding population of Sydney. Application of environmental legislation has led to natural heritage vegetation being conserved and enhanced, hence reducing the environmental footprints of urban growth.

© 2011 Green Lines Instituto para o Desenvolvimento Sustentável. All rights reserved.

Keywords: Ecologically sustainable development, heritage significance, vegetation, environmental legislation, Australia

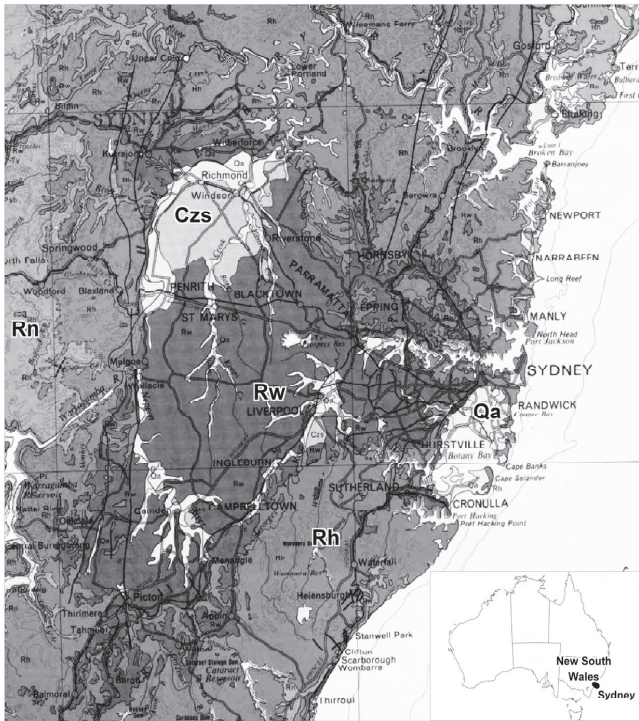
Introduction

During the initial stages of the European settlement in Sydney (now the State capital of New South Wales, Australia, Figure 1), the foremost concern was survival of the colony. There was little consideration for conservation of the native vegetation.

Pattern of settlement

The early Sydney colonial settlement from 1788 was initially clustered around the harbour foreshores where there was a suitable supply of fresh water (Clark, 1963). The land also appeared to have fertile soil with a "luxuriant prospect of its shores, covered with trees to the water's edge" (Tench, 1789). Although the pre-1788 flora once supported rich ecological communities including Turpentine-Ironbark Forest on the shale ridgetops (Attenbrow, 2010), it was quickly found that the sandstone-derived soil around the harbour (Figure 1) was shallow and of low agricultural value (Perry, 1963). In the 1790s relatively fertile shale-derived soil was discovered on the undulating landscape west of the main settlement and attempts at farming began in earnest. Initially the settlement remained confined because of the rugged terrain and non-arable soils surrounding Sydney. As early as 1803, Governor King of NSW forbade the clearing of riparian vegetation because it led to erosion, flooding and consequent loss of soil, houses, crops and stock (Bolton, 1992). It could be argued that as the colonial settlement grew, a new order was imposed too

quickly on the landscape, resulting in dramatic modification of indigenous flora and fauna (Young, 1996). The pattern of settlement and land clearing was largely defined by the distribution of the arable shale-derived soils.



Legend
 ■ Rw = TRIASSIC Wianamatta Group, Sandstone and shale
 ■ Rh = TRIASSIC Hawkesbury Sandstone, Quartz sandstone with some shale
 ■ Rn = TRIASSIC Narrabeen Group, Multi-coloured chert sandstone, quartzose sandstone, shale and claystone
 ■ Qa = QUATERNARY Gravel, sand, silt and clay
 ■ Czs = DIFFERENTIATED Poorly consolidated sandstone, conglomerate siltstone and "perched" alluvium

Figure 1. Geology of Sydney, Australia (adapted from Bruncker and Rose, 1967)

By 1850 settlement had spread throughout New South Wales with the exception of the semi-arid western region (Young, 1996). In the 1890s, due to the comparative ease of construction, the Sydney railway routes followed the shale geological bands of the more arable lands (Spearitt, 1978). The late 19th and 20th centuries saw urban development spread out from the railway stations across the flat farming lands (Figure 2). There was also heightened demand for housing and family farm lots with the return of soldiers and influx of migrants, especially at the end of World War II (Clark, 1963).

Two large conservation areas on rugged sandstone terrain not suitable for agriculture were declared to the north and south of Sydney; the Royal National Park in 1879 and Kuring-gai Chase National Park in 1894, with the Blue Mountains National Park west of Sydney declared in 1959 (Figure 3). Despite these parks being seen more as recreation areas than as conservation reserves (Young, 1996), the indigenous sandstone ecosystems were preserved.

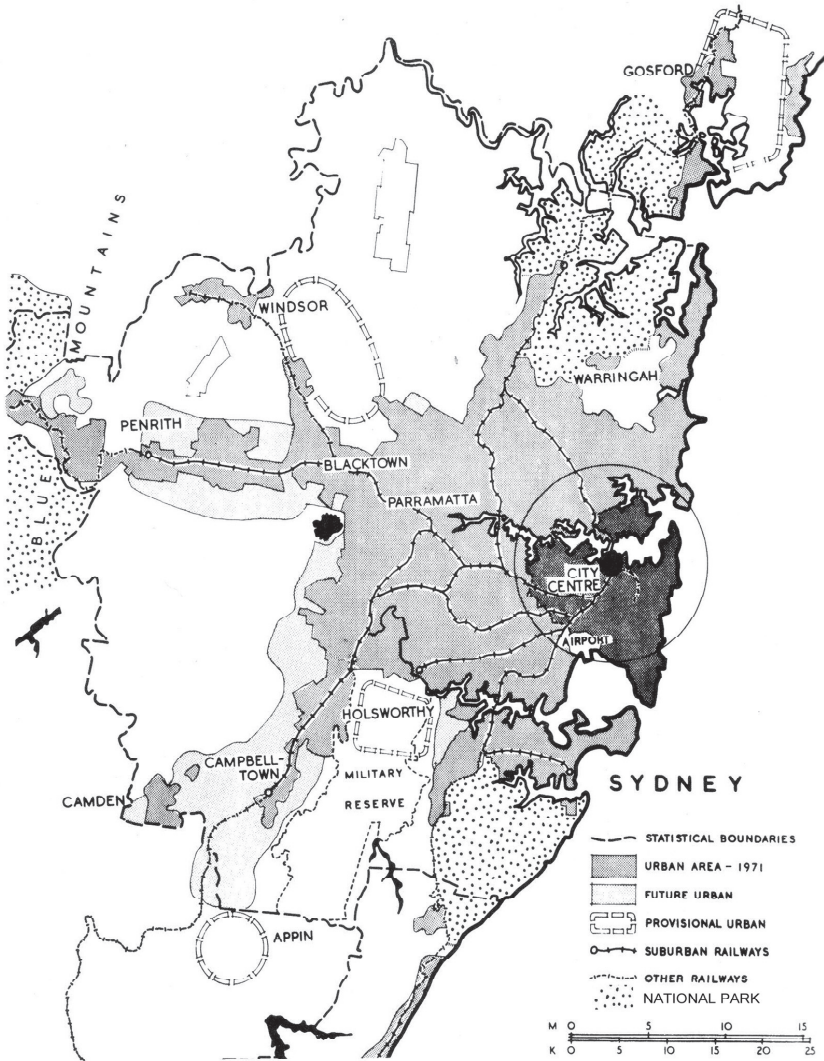


Figure 2. A 1973 attempt to map the future growth of Sydney (adapted from Spearitt, 1978)

Clearing regulations remained predominantly concerned with managing soil, water and forest resources; and the focus of biodiversity conservation was confined to within National Parks (Dore *et al.*, 1999). Today, in the 12 138 km² of the Greater Urban Area of Sydney, comparatively little indigenous vegetation remains on arable land available for development.

Currently, about one fifth of Australia's population of 22 million reside in Greater Urban Sydney (Figure 4). From 2001 to 2009, the population of Sydney grew by 11 percent, reaching 4.5 million in June (Australian Bureau of Statistics, 2009).

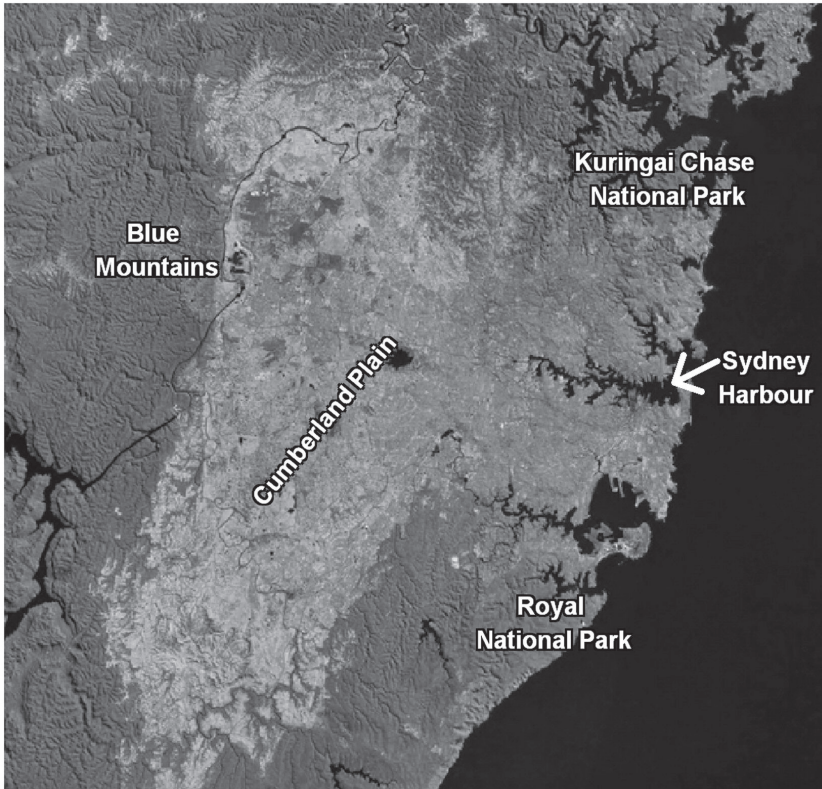


Figure 3. Location of Sydney Harbour, the Cumberland Plain, adjacent National Parks and Blue Mountains

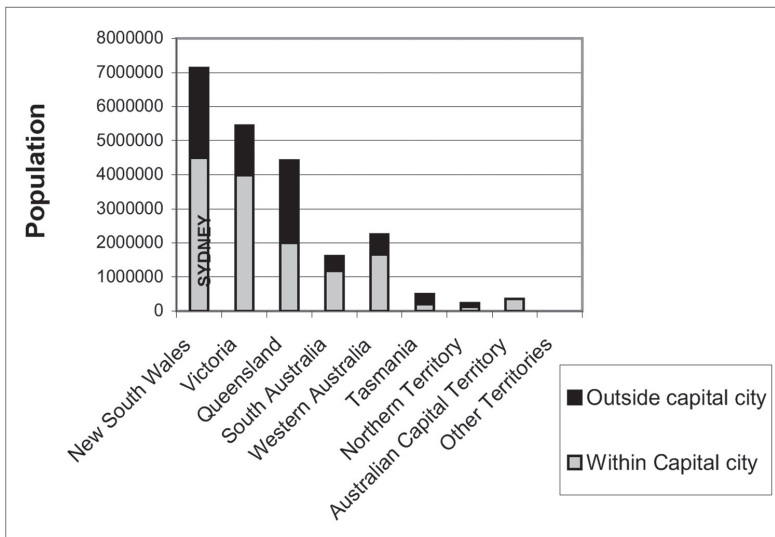


Figure 4. Estimated Resident Population distribution in Australia at 2009 (data source Australian Bureau of Statistics, 2009)

Evolution of Environmental Attitudes and Legislation in NSW

Although population and land clearing continued to increase, especially post World War II, there was growing awareness and recognition of the significance of the natural heritage and the need for its protection. In 1948, The Rivers and Foreshores Improvement Act was passed. This Act categorised all land within 40 m of a mapped creek as "protected land" which could not be developed.

In 1951, the County of Cumberland Planning Scheme was the first attempt in New South Wales at a comprehensive and coordinated town plan for metropolitan Sydney. The cornerstone of the Cumberland County Council Scheme was a 'green belt' around the existing urban footprint (Figure 5).

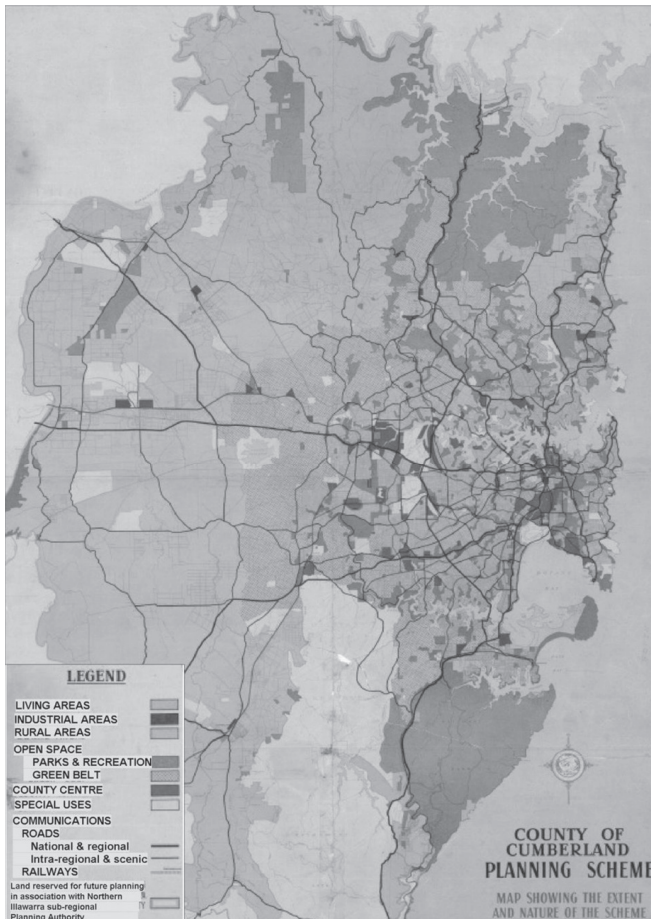


Figure 5. County of Cumberland Plan (adapted from Cumberland County Council, 1948)

With increasing environmental awareness in the 1970s, new environmental legislation such as the National Parks and Wildlife Act 1974 was enacted. In 1979, the Environmental Planning and Assessment Act (EP&A Act) obliged applicants and consent authorities to assess and consider impacts of proposed development on native flora and fauna. As a consequence of the EP&A Act, significant natural heritage areas, including coastal wetlands, bushland in urban areas and littoral rainforests, were identified in State Environment Planning Policies. The New South Wales Land and Environment Court became the independent arbitrator.

The ratification of the 1992 International Convention on Biological Diversity led to the creation of two central Acts that now regulate aspects of development in NSW to ensure conservation of biodiversity and natural heritage. The NSW Threatened Species Conservation Act 1995 relates to State significant

species and communities and the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 relates to Nationally significant species and communities.

Under the Threatened Species Conservation Act 1995, an independent Scientific Committee of ten scientists makes determinations on the status and consequently lists native flora, fauna and ecological communities considered likely to become extinct in nature. Clearing of an endangered ecological community (EEC) or habitat of a species or population, whether deliberate or unintentional, without prior development approval, including on privately owned land, is a criminal offence.

The legislation provides for integration of biodiversity values into better strategic land-use planning. Threatened species conservation has also been embedded into the NSW Native Vegetation Act 2003 that regulates clearing of all remnant vegetation in rural areas. Subsequent introduction of the Threatened Species Legislation Amendment Act 2004 lists "Key Threatening Processes" to native vegetation.

In the last 20 years there has been a strong sense of urgency to halt and reverse the damage to native vegetation in NSW and to develop sustainable land management. The following case studies demonstrate how the legal status of heritage native vegetation remnants has provided a tool for negotiating improved sustainable development outcomes.

Case Studies

Case 1. Remnant ecological communities in Ryde Local Government Area and restoration of Ermington saltmarsh

Ryde Local Government Area is located 10 km from the Sydney CBD. The native vegetation was extensively cleared during early European settlement to provide timber and farmland on the gently undulating shale-derived soils. The underlying sandstone has been exposed by river erosion to form steep-side valleys (Benson and Howell, 1990).

Most of the native vegetation is now restricted to sandstone slopes. On the shale-derived soils, the original vegetation is now largely confined to regrowth or scattered remnants (Figure 6). Along the estuarine riverbanks, only small patches remain of very degraded saltmarsh. The saltmarsh along estuarine rivers and the remnant vegetation on shale-derived soils are listed as Endangered Ecological Communities under the National and/or State Acts. The vegetation on the sandstone-derived soils is preserved extensively within national parks.

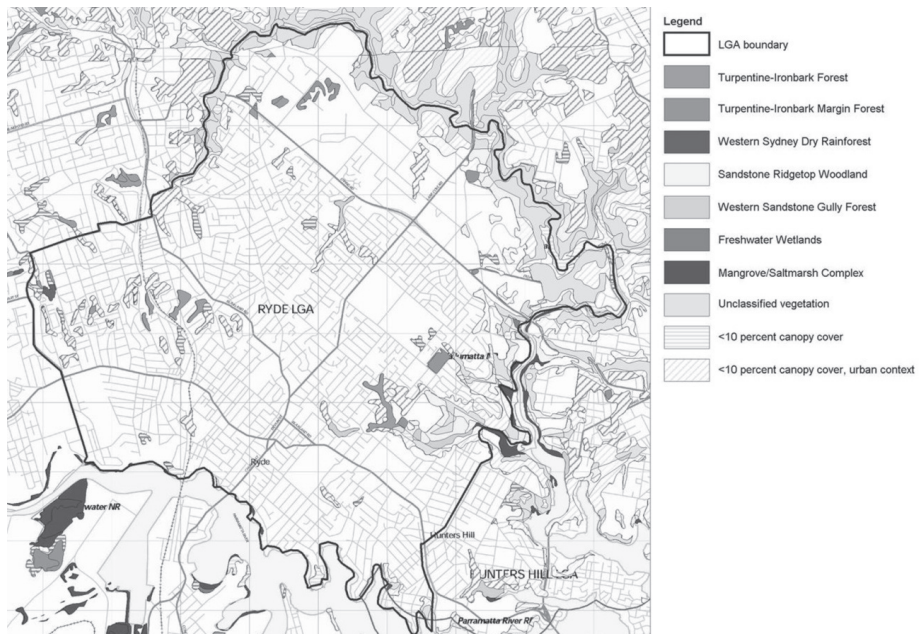


Figure 6. Ecological Communities identified in the City of Ryde (adapted from NPWS 2002)

Coastal saltmarsh was listed in 2004 as an endangered ecological community (EEC) in NSW. The Scientific Committee determined that saltmarshes that grow in landward areas inundated by estuarine tidal waters are an important ecological habitat for a diverse range of fauna that are globally threatened by human disturbance, including infilling and weed invasion (NSW Scientific Committee, 2004).

Restoration of Ermington saltmarsh

Ermington saltmarsh is located on the shore of Parramatta River opposite the Sydney Olympic Park site. The land adjacent to the Ermington saltmarsh was used as a Naval stores site from 1943 to 1990. In 2002, it was rezoned to residential with a river-park public foreshore area.

During planning of the redevelopment, the vulnerable listed saltmarsh species *Wilsonia backhousei* was recorded. For the long-term survival of the listed species, the degraded saltmarsh (Figure 7) required restoration. Natural flow regimes and tidal inundation were determined and reinstated, and the saltmarsh carefully weeded. By July 2008 the saltmarsh had been restored (Figure 8). The project provided an opportunity to demonstrate a model for implementing methods to successfully restore a highly degraded EEC and habitat of a threatened species to the original natural environment.



Figure 7. Degraded and eroded Ermington saltmarsh, August 2005



Figure 8. Restored Ermington saltmarsh, July 2008

Case 2. Three Cities Plan in outer southwestern Sydney

In 1973 the State Planning Authority of New South Wales announced a plan for the three new cities on the south-west fringe of Sydney centred on the existing towns of Campbelltown, Camden and Appin (Figure 9). Campbelltown was the first to be expanded and is now a thriving urban community. The Camden area has continued to develop, with the Spring Farm component currently under construction.

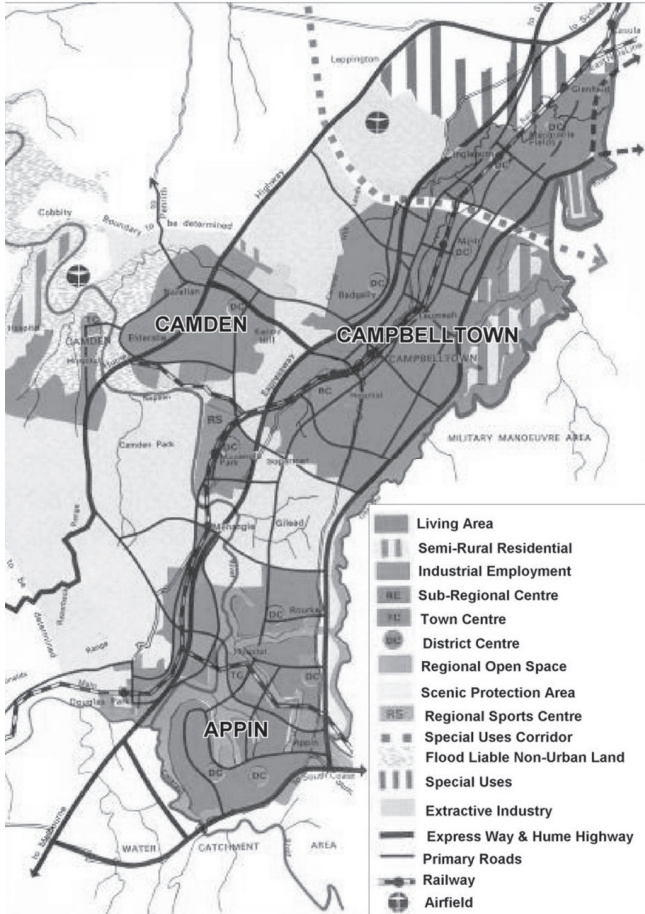


Figure 9. Three Cities Plan (adapted from State Planning Authority of NSW, 1973)

Spring Farm (Camden)

The vegetation of the proposed new developments at Spring Farm was surveyed and areas supporting vegetation of National and State significance mapped (Figures 10, 11). Three Endangered Ecological Communities were identified including the Critically Endangered Elderslie Banksia Scrub Forest.



Figure 10. Spring Farm vegetation sampling locations overlaid on aerial photograph



Figure 11. Vegetation mapping at Spring Farm

Using the collected data and location of mapped creeks, conservation corridors were determined. The corridors included conservation offsetting for areas of natural heritage that are to be cleared for urban development (Figure 12).

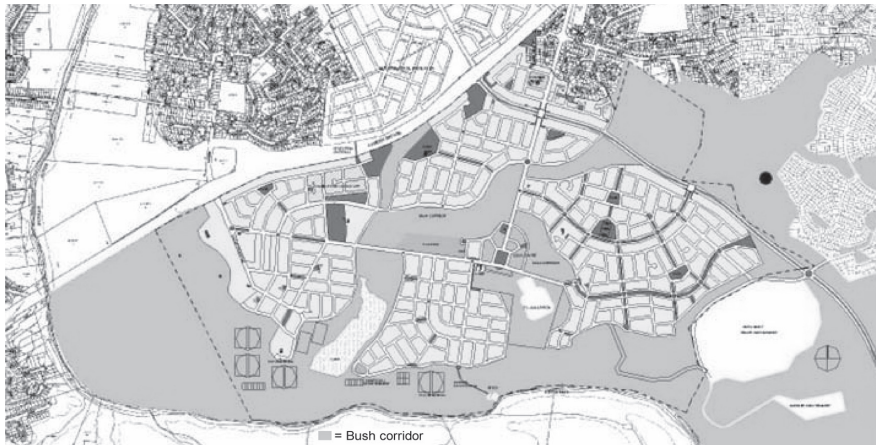


Figure 12. Spring Farm conservation corridors (adapted from Camden Council, 2006)

Appin-Wilton

The project and conservation works for Appin-Wilton, the third of the new cities identified in 1973, are commencing in stages, although infrastructure was installed earlier (Figure 13). The Appin-Wilton area still remains as a series of farms, coal mines and villages (Figure 14). The environmental heritage of the area is currently being investigated and planning for conservation corridors is underway (Figure 14). The identification of corridors of conservation and heritage significance is a central issue in the planning for development of Appin-Wilton.



Figure 13. Existing Infrastructure at Appin (adapted from Walker Corporation, 2010)

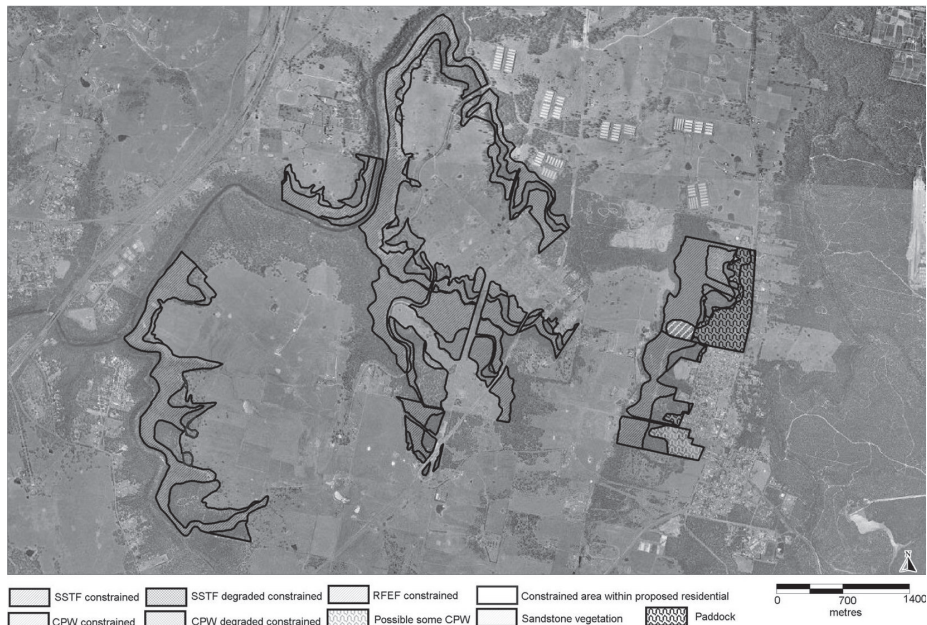


Figure 14. Identifying vegetation constraints at Appin

Conclusions

The native vegetation communities on the more arable soils of the Sydney region derived from shale, basalt or alluvium, extensively cleared for agricultural and subsequent urban development, are listed as endangered ecological communities under State and National legislation. Communities on infertile sandstone-derived soils were reserved in National Parks to the north and south of Sydney in the 1890s or, in the case of the sandstone areas to the north-west, west and south-west, were passed over for agriculture and then largely reserved in the 20th century in catchment areas and additional national parks. There has consequently been extensive survival of the sandstone vegetation, and a less pressing requirement for it to be included in listings of endangered ecological communities.

The case studies illustrate the extent of historic loss of environmental heritage in existing urban development areas such as the Ryde Local Government Area and in agricultural lands such as Camden and Appin, to accommodate the expanding population of Sydney. Application of environmental legislation has led to natural heritage vegetation being conserved and enhanced, hence reducing the environmental footprints of urban growth.

References

- Attenbrow, V. (2010) *Sydney's Aboriginal Past investigating the archaeological and historical records* 2nd Edition, University of New South Wales Press Ltd.
- Australian Bureau of Statistics (2009) 3218.0 Regional Population Growth, Australia. Accessed 28 April 2009 online at Australian Bureau of Statistics website: <http://www.abs.gov.au>.
- Benson, D. and Howell, J. (1990) *Taken for granted: The bushland of Sydney and its suburbs*, Kangaroo Press, Kenthurst.
- Bolton, G. (1992) *Spoils and Spoilers: A History of Australians and their environment*, Second Edition, Allen and Unwin, North Sydney.
- Brunker, R.L. and Rose, G. (1967) *Sydney Basin 1:500,000 Geological Sheet*, Geological Survey of New South Wales.
- Camden Council (2006) Figure 4 - The Masterplan, Camden Council Development Control Plan, Accessed 24 March 2011 online at: http://www.camden.nsw.gov.au/files/development/camden_dcp_2006/part%20one.pdf
- Clark, M. (1963) *A Short History of Australia*, New American Library.

- Cumberland County Council (1948) County of Cumberland Planning Scheme Map showing the extent and nature of the scheme in general terms. Accessed 23 March 2011 online at Dictionary of Sydney website: <http://www.dictionaryofsydney.org/image/25982>
- Dore, J., Hayes, G. and Binning, C. (1999) Native vegetation - national overview : States, Territories, Commonwealth, stocktake of native vegetation management, prepared for ANZECC - Environment and Conservation Ministerial Council and Native vegetation managers in all Australian jurisdictions, Australia and New Zealand Environment and Conservation Council & Griffin NRM (Firm), Canberra. Accessed 28 June 2005 online at: <http://www.deh.gov.au/land/publications/nvf-overview/pubs/stoktak.pdf>
- NPWS (2002) Native Vegetation Maps of the Cumberland Plain Western Sydney Final Edition, Threatened Species Unit, Conservation Programs and Planning Division Central Directorate, NSW National Parks and Wildlife Service, Hurstville.
- NSW Scientific Committee (2004) Coastal saltmarsh in the NSW North Coast, Sydney Basin and South East Corner bioregions - endangered ecological community listing NSW Scientific Committee - final determination, Accessed 7 May 2010 online at NSW Department of Environment, Climate Change and Water website: <http://www.environment.nsw.gov.au/determinations/CoastalSaltmarshEndSpListing.htm>
- Perry, T. M. (1963) Australia's First Frontier- The Spread of Settlement in New South Wales 1788-1829, Melbourne University Press.
- Spearitt, P. (1978) Sydney Since the Twenties, Hale and Iremonger. Sydney.
- State Planning Authority of NSW (1973) The New Cities of Campbelltown, Camden, Appin, Structure Plan.
- Tench, W. (1789) A narrative of the Expedition to Botany Bay: With an Account of New South Wales Ch 8.
- Walker Corporation Pty Ltd. (2010) Existing Infrastructure Appin Drawing 10 Rev 1/ April 2010, Walker Corporation Pty Ltd., Sydney.
- Young, A.R.M. (1996) Environmental change in Australia Since 1788, Oxford University Press, Melbourne.

Acknowledgments

We wish to thank clients of Anne Clements and Associates Environmental Consultants including Mirvac, Cornish Group, Landcom, Lean & Hayward (Spring Farm), Ryde City Council, Thiess constructions on behalf of Department of Defence (Ermington Saltmarsh), Walker Corporation, especially Gerry Beasley (Appin-Wilton); and Polly Simmonds, Rebecca Burley and Phillip Hughes for assistance with the preparation of figures and editing.