Managing the Urban Edge

Discussion Paper December 2013

CONSERVATION COUNCIL
ACT REGION

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Cover Image

GIS Map of Throsby by David Wong

Disclaimer

Every effort has been made to ensure that the information in this paper is accurate at the time of printing. It is however intended as a discussion paper, and the Conservation Council ACT Region accepts no responsibilities resulting from changes to management, planning and legislation or loss resulting from the use of this paper.

Explanatory Notes

This document is intended as a discussion paper to be utilised as a basis for discussions between government, developers and community groups regarding the improvement of the management of ecological values at the urban edge. In an effort to address complex and pervasive issues in a constructive manner, the document has been intentionally focused on the protection and enhancement of ecological values at the urban edge. There are a number of relevant cross-cutting issues that are beyond this scope, such as social and economic implications of urban development and the urban edge and the building of sustainable suburbs and cities more generally.

Similarly, this document has been based on the past experiences of the members of Bush on the Boundary Committee and the member groups of the Conservation Council ACT Region. This means that it has focused on the ten issues that have been perceived as the most significant in the past ten years of Canberra's development. These ten issues are not intended as an exhaustive list of considerations. The intention of this approach is to explicitly analyse these significant issues with a view to reducing their impacts in the future. Because this document has focused on past experiences it does not consider future concerns, such as climate change.

The limitations of this document in terms of cross-cutting issues and future considerations demand a strategic approach to its use. This document is not intended to be used verbatim, or in isolation, rather it has been designed to provide a record of past experiences related to ecological values and the urban edge and suggestions for how these issues might be addressed in the future. Addressing these issues in the long term will require a strategic approach that incorporates social and economic considerations and proactively addresses potential issues such as climate change, before they occur.

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Principles

Overarching Principle

Retention and enhancement of ecological values should be incorporated into the design and ongoing management of existing and new urban developments.

Management Principles

Management of ecological values at the urban edge should be:

Targeted	○ Pay specific attention to the areas where the urban edge abuts areas of ecological value ○ Consider both the direct and indirect impacts arising from the urban edge ○ Deliberately consider the impacts of the urban edge on ecological values
Integrated	○ Recognise that urban edge issues are interrelated and must be managed in tandem ○ Utilise partnerships and information sharing that acknowledges the responsibilities, capacity and requirements of different individuals, groups and areas ○ Maximise opportunities to align with existing and potential projects
Adaptive	○ Experiment with innovative management solutions ○ Monitor effects of measures, before, during and after they occur ○ Change management to reflect lessons learned
Strategic	○ Use the precautionary principle to inform decision-making. That is, not delaying management actions due to a lack of scientific knowledge if there is a significant risk of ecological damage ○ Manage ecological values proactively, before they show signs of stress or ecosystem collapse ○ Establish productive working relationships with all relevant organisations and stakeholders at the earliest possible stage to reduce inefficiencies and maximise opportunities
Achievable	○ Ensure ongoing costs of managing urban edge effects are achievable within budgetary constraints ○ Ensure that policy measures are enforceable and will be complied with ○ Consider the alignment of measures with social requirements

Connectivity

- Connectivity exists differently for different species and ecological communities and should be managed accordingly
- Areas of potential 'connectivity' include not just protected areas, but urban open space, creeks and wetlands, private gardens, rural lands and landscaped areas
- Successful 'connectivity' requires an integrated and sympathetic network of protected areas and biodiversity 'corridors' throughout the landscape
- Ecological functioning depends on the maintenance of opportunity for connectivity
- The loss of existing connections should be avoided
- Opportunities for enhancing connectivity should be identified and implemented
- Connectivity planning is a long–term process that should be incorporated at all stages of a planning process and across all parts of a given landscape irrespective of land use, tenure or formal designation

Domestic Animal Management

- Introduced predators such as cats and dogs are a threat to ecological values
- Sensitive fauna and conservation habitats abutting suburbs and housing developments must be protected from the impacts of domestic animals
- Restricting the ability to roam has benefits for the health and welfare of domestic animals
- Policies must be sensitive to the high social value of pet ownership within the ACT
- Restrictions should be placed on domestic animals that have the potential to threaten biodiversity in natural areas

Invasive Plant Species

- Invasive plants need to be managed proactively, with threats being identified and addressed before they spread.
- Known or potentially invasive plants should not be planted close to areas of ecological value

Mature Trees

- Mature trees, and their associated vegetation, have significant ecological values which should be retained where possible
- The continuation of mature trees in the landscape requires the retention and planting of trees in a range of age classes
- Mature trees need to be identified early and managed before, during and after development

Fire Management	Rural Leases	Roads and Infrastructure
Ecological assets should be protected alongside lives and property	**Rural Leaseholders should be given the opportunity to be involved in decision-making processes that affect their land**	**Planning, design and maintenance of roads and other infrastructure should take into account ecological values, constraints and opportunities for the lowest possible impact on the natural environment**
Asset Protection Zones should be incorporated within the urban footprint of the development wherever possible		
Asset Protection Zones should be located outside of areas of ecological value where there is a risk of impacting on those values	**Rural Leaseholders should be supported in protecting and enhancing the ecological values on their land, with particular consideration for managing urban edge effects**	**Impacts on ecological values occur both during the construction phase and throughout ongoing operation and existence**
	Where the urban edge approaches rural land with environmental value, urban edge principles should guide management action	**Infrastructure developments should not be located within areas of high ecological value where there is a risk of compromising those values.**

Access and Recreation

Conservation should be a priority over recreation in areas of high ecological value

Recreation in areas of ecological value should be:

- **passive;**
- **oriented towards furthering appreciation of nature; and**
- **designed in a manner that ensures minimal environmental impact**

Public access can increase opportunities for high impact activities such as firewood collection, waste dumping and off-road driving and trail biking. The potential for these activities to impact on ecological values should be managed

Aquatic and Riparian Areas

Aquatic and riparian ecosystems should be managed in a manner that enhances ecosystem functioning in terms of flows, water quality and aquatic connectivity

New suburb planning should include the principles of 'water sensitive urban design'

- **protecting our natural water systems**
- **managing stormwater in ways that improve water quality**
- **reduces costs**
- **recycles**
- **is used for watering vegetation**
- **minimises negative impact to natural aquatic and wetland areas; and**
- **improves the aesthetic environment**

Community Participation

Decision-making and planning processes should be transparent and accountable to the community

Communities should be involved in the decisions that affect them

Early cooperation and information exchange between key stakeholders will facilitate negotiation and ensure best outcomes

Community participation creates a strong sense of ownership, which is essential for effecting behavioural change

Communities should be educated, consulted and encouraged to participate in dealing with each of the issues presented in this document

Community participation should be actively pursued through specifically designed programs where new developments abut areas of ecological value

Involving the community in the enhancement and protection of ecological values benefits the community, the environment, developers and government

Key Terms

Ecological Values

The ACT is home to a great diversity of outstanding ecological values. The most visible of these are the unique plants, animals and ecological communities. Many of these are listed as threatened under ACT and Commonwealth Legislation. For some, such as Natural Temperate Grasslands and Box Gum Grassy Woodland ecological communities, many of the last viable remnants in Australia are located within the ACT.

The ACT's ecological values also exist in the form of ecosystems services. These refer to the provisioning, regulating, supporting and cultural services of the environment. In the ACT these range from habitat, food and connectivity to clean air, water and climate regulation to cultural heritage, scientific study and recreation. These services are critical to the survival and wellbeing of the ACT's human, plant and wildlife populations.

Ecological values are not limited to protected areas such as the Canberra Nature Park. They also exist on public and private land, under a variety of management arrangements such as rural leaseholds, suburban gardens, roadside verges and drainage easements. Many ecological values are not static and occur across a range of jurisdictions. This means that all land and resource managers have a part to play in their retention and enhancement.

Urban Edge

Canberrans are very lucky in that they are surrounded by unique and beautiful areas of ecological value. Conversely, this situation means that many of the ACT's areas of ecological value are surrounded by urban development. The interface between these urban and ecological areas is referred to in this document as the 'urban edge'.

The urban edge does not only occur where suburbs abut nature reserves. It is also present where suburbs abut rural leases, public parks, drainage easements, river systems and other areas with ecological values. As a consequence, the management, planning and design of this interface is a complex but critical undertaking.

This document is divided into a series of issues associated with this process. Some of these issues relate to the direct impacts resulting from the initial development and expansion of the urban edge such as connectivity, mature trees and roads and infrastructure. Others, such as domestic animal, invasive plant and fire management, refer to the avoidance and management of impacts associated with the ongoing occupation of urban areas. Most of the issues, in particular those such as community participation, transcend these distinct stages and their consideration is essential throughout.

Introduction

Canberra's identity and urban planning has stemmed from the concept of a 'Bush Capital' ever since its founding, 100 years ago. Today, an increasing population and economy is driving rapid urbanisation, expanding the urban edge and threatening its 'bush' areas and the species that depend on them. In the ACT, these bush areas are home to a number of endangered ecological communities and species that need to be protected.

The direct impacts of urbanisation, such as habitat destruction and fragmentation, are often evident early on. In the longer term, however, the suburbs themselves also result in significant, but more indirect, impacts along the urban edge. These impacts relate to issues as diverse as domestic animal management, invasive pest species, fire management, access and recreation. Where the urban edge abuts areas of ecological value the impacts of these multiple individual factors are compounded resulting in greater environmental stress. This process results in ecological values that are less resilient and more sensitive to additional impacts or shock events such as fire or climate change.

Our Experience

Wildlife on the Edge

The urban edge presents a variety of pressures on already vulnerable wildlife such as Canberra's declining woodland bird population. The ACT's woodland birds include a number of listed threatened species such as Brown Treecreepers (*Climacteris picumnus*), Hooded Robins (*Melanodryas cucullata*) and Superb Parrot (*Polytelis swainsonii*).

The expansion of the urban edge destroys habitat and connectivity for these birds. It also increases predation by domestic animals and competition from introduced and/or artificially inflated populations of other birds. These, and other impacts combine to make woodland bird populations less resilient and more susceptible to the impacts of shock events such as droughts and fires. Even without shock events, the gradual accumulation of impacts can eventually result in local extinctions

Our Experience

Bush on the Boundary

The idea for Bush on the Boundary Reference Groups (BoB) arose from a conversation between the Conservation Council ACT Region, the Ginninderra Catchment Group, the Canberra Ornithologists Group and academics from the Australian National University. The conversation related to the potential impacts of the impending development of Forde and Bonner in Gungahlin on the ecological values of Mulligans Flat.

The developers, the ACT Government and the Gungahlin Community Council were invited to meet with the group and BoB Gungahlin was formed. BoB soon expanded to establish groups addressing developments at Molonglo and North Watson. These groups provide stakeholders with the opportunity to discuss new developments and strategise approaches to retain and enhance adjacent ecological values.

As Canberra rapidly expands, so to does the consciousness of the impacts of urban edge on sensitive ecological values. Developers, government, community groups, academics and residents are increasingly attempting to protect and enhance their local ecological values within their jurisdictions. With limited funding, a lack of baseline knowledge and ever increasing pressures, this is not an easy feat. These issues need to be addressed on a targeted case-by-case basis, but also on a broader, more integrated and strategic level. Furthermore, they need to be addressed in a manner that

allows for adaptive management so that the lessons learned are not lost. Key to this approach to management is considering the achievability of managing the impacts of the urban edge. If measures are unable to be enforced, unlikely to be complied with or have significant economic or social costs they are unlikely to be successful. The management of the urban edge mist be targeted, strategic, integrated, adaptive and achievable.

Strategic Solutions

Nature Friendly Landscaping

Landscaping on public lands and in new developments is an excellent opportunity to address issues related to connectivity, mature trees, fire management, water and invasive plant species.

A key element in this approach could be the creation of ACT wide positive and negative planting lists. These lists could be localised as needed and used as a basis for large scale landscaping. Smaller scale lists have already been created by various agencies and within each of the BoB groups.

Easy to follow and comprehensive guidelines for ecological landscaping should also be incorporated into community engagement strategies. Suburban gardens form a large part of the urban edge and deserve significant attention.

The recognition of this need resulted in the creation of Bush on the Boundary Reference Groups (BoB), as described in *Our Experience – Bush on the Boundary (p 10).* These groups provide an opportunity for key stakeholders to meet and discuss the potential impacts of new urban developments on ecological values.

This document is based on the collective and individual experiences of the BoB members, as well as those of the member groups of the Conservation Council ACT Region, the peak body for community environment groups in the ACT Region. This document should not be considered a definitive guide, rather as an impetus for considering critical issues. It is envisioned as a discussion paper, to be adapted and expanded with new ideas, experiences and approaches. In particular, there is a need to address the ecological issues considered in this document in tandem with social and economic considerations. It is hoped that the lessons learned by each of these groups and individuals can be applied in future urban management, planning and design. This process is essential if the ACT's ecological values are to be retained and enhanced.

Strategic Solutions

Bushland Management Team

Managing ecological values that are impacted by the urban edge is a complex and technical task. At present, this management is undertaken by both ACT Government Rangers and volunteer based community groups. Both the rangers and community groups are limited by considerable time and resource constraints. As a consequence much of the on-ground elements of impact management have lacked a strategic approach.

A potential solution to this situation is the establishment of a professional bushland management team targeted at specifically addressing the urban edge. This team could provide technical advice and undertake on-ground action to support community groups and rangers.

This idea was supported, in the context of Canberra Nature Park Management, by the Commissioner for Sustainability and the Environment (2011). A significant portion of the necessary funding could be obtained by encouraging developers to offset the impacts of newly constructed urban edges.

Key Recommendations

1. **Update policies, strategies and legislation to address the issues discussed within this document.**

2. **Develop measures that identify appropriate buffer zones for the urban edge, based upon the best available scientific research.**

3. **Incorporate the principles and recommendations into the development of new suburbs and the ongoing management of those that already exist.**

4. **Evaluate the ecological values of the ACT on a territory wide basis by:**
   4.1. Further developing the ACTMapi system by;
   4.2. Incorporating the accumulated knowledge of local academic research and community groups such as ParkCare and Catchment Groups and commissioning research to fill any gaps; with a view to
   4.3. Undertaking a broadscale Strategic Assessment of future development.

5. **Participate in Bush on the Boundary Reference Groups for new developments where the urban edge will abut areas of ecological value as soon as is practicable. These groups should involve:**
   - Government
   - Developers
   - Community Groups
   - Academics
   - Rural Leases
   - Resident Representatives

Connectivity

Principles

Connectivity exists differently for different species and ecological communities and should be managed accordingly.

Areas of potential 'connectivity' include not just protected areas, but also urban open space, creeks and wetlands, private gardens, rural lands and landscaped areas.

Successful 'connectivity' requires an integrated and sympathetic network of protected areas and biodiversity 'corridors' throughout the landscape.

Ecological functioning depends on the maintenance of opportunity for connectivity.

The loss of existing connections should be avoided.

Opportunities for enhancing connectivity should be identified and implemented.

Connectivity planning is a long–term process that should be incorporated at all stages of a planning process and across all parts of a given landscape irrespective of land use, tenure or formal designation.

Significance

Connectivity refers to the connections an individual, population, species or ecological community needs to survive. These include connections to sufficient habitat, food and water sources, reproductive opportunities, shelter, symbiotic species and ecological processes. The connections themselves are avenues through which these resources can be accessed by the species in question. It is these avenues that make an area permeable to a species. As a consequence, the connectivity requirements of different species depend on various factors including their mobility, habitat type, and diet and migration patterns. For an ecological community, connectivity is often considered in more spatial terms and generally refers its continuous existence across a landscape. For an individual species, connectivity requirements may include more isolated elements such as rocks, waterways or vegetation cover. For example, some bird species have the ability to fly long distances to access resources so roadways may not impede connectivity. However, a lack of large mature trees, or wide open species may have an adverse effect. By contrast, small birds with limited ranges may require dense vegetation cover with rocks and woody debris. Wide clearings or patches of limited complexity may therefore impede connectivity.

Where connectivity requirements are not met, fragmentation occurs. If the habitat of an individual becomes fragmented, it is separated it from the resources upon which it depends, leaving it unable to survive. When an entire population becomes fragmented it is unable to restock from other populations, leaving it vulnerable to disturbances such as invasive species, bushfire and predation. Where sections of ecological communities are small and fragmented, they become unable to support genetic, ecological or species biodiversity leading to unbalanced and deteriorating ecosystems, such as that described in *Our Experience – Kangaroo Grazing at Mount Majura Nature Reserve (p 14).*

Existing situation

Canberra's image as the 'Bush Capital' stems from its extensive network of protected areas that includes Canberra Nature Park, the Molonglo and Murrumbidgee River Corridors and Namadgi National Park. This network is an essential element of Southeast Australia's extensive alpine, sub-alpine and temperate natural landscapes.

Canberra's increasing urbanization is increasingly isolating these reserves from each other and from other areas of ecological value, leading to concerns about fragmentation. This situation is already leading to management concerns in several areas, an example of which is the concentration of Eastern Grey Kangaroos and the effect their intensified grazing is having on grassland ecosystems as described in *Our Experience- Kangaroo Grazing at Mt Majura Nature Reserve (p 14)*.

Our Experience

Community Mapping of Connectivity

Collaboration between the Conservation Council ACT Region, the ACT Government and the Australian National University culminated in an innovative Biodiversity Mapping Project. A new computer and software system has been set up at with access to the same set of baseline ecological information for spatial planning and development control that is used by the ACT Government for identifying land use changes.

The Conservation Council is the peak body for more than 40 community environment groups. The project provides these groups with the training to use the new system to find information and create maps regarding ecological values such as threatened communities and species, vegetation types and the existing and potential connectivity routes between them. The groups are then able to use this information to inform their work and to contribute to planning decisions regarding sensitive issues such as connectivity. Potential future avenues for this project include integration with global, national and local systems such as the Atlas of Australia.

Our Experience

Kangaroo Grazing at Mount Majura

Across much of the ACT, populations of Eastern Grey Kangaroos are becoming increasingly fragmented by infrastructure and urban development. This is thought to be having significant ecological consequences, particularly for grassy ecosystems, and is creating a safety threat to motorists. This situation has lead to the creation of the *ACT Kangaroo Management Plan* (2010) and management interventions such as culling.

Mount Majura Nature Reserve has been no exception to this phenomenon with resident kangaroos hedged in by the Federal Highway, the suburbs of Watson, Hackett and Ainslie and fencing along the Majura Parkway. A 2012 comparative study by the local environment group Friends of Mount Majura, found that kangaroos had an even greater effect on overgrazing in Mount Majura Nature Reserve than the introduced European Rabbit.

Overgrazing in Mount Majura Nature Reserve has minimised the height of ground cover vegetation and created bare patches of soil. This has disturbed habitat, reduced the ability of ground covers to reproduce, allowed weed incursion and resulted in considerable erosion. Kangaroos are disturbing revegetation efforts by removing protective casings and consuming plantings. These factors are hampering restoration efforts and degrading the ecological values of the reserve.

Actions to control the kangaroo population have been limited by the reserve's open nature and proximity to urban areas. In an effort to improve kangaroo connectivity with nearby rural properties, expansions to the Majura Parkway will include specially designed kangaroo underpasses referred to as 'fauna friendly' dry culverts, stock crossings and shared underpasses with bicyclists.

The challenge of maximising connectivity is recognized in the ACT's natural resource management plan – *The Bush Capital Legacy*. (NRMC 2009) Wildlife connectivity mapping via ACTMAPi has also been developed and was made available to community groups in August 2012. As described in *Our Experience – Community Mapping of Connectivity* (p 14), this proved very beneficial for fostering informed community input into policy and planning. The ACT Planning Strategy (2012), developed in accordance with the *ACT Planning and Development Act 2007,* also includes connectivity considerations with a provision for the inclusion of 'biodiversity corridors'. There is however some concern that, given that each species and community have varying connectivity requirements, the isolated use of 'biodiversity corridors' as consistent with their legislative definition, would be insufficient to adequately address connectivity issues.

Recommendations

1. **Incorporate connectivity planning in all projects and at all levels of planning by:**
   - 1.1. Using the wildlife connectivity mapping available via ACTMAPi in landscape planning and design;
   - 1.2. Build considerations of connectivity into the requirements of Environmental Impact Assessments and Strategic Assessments; and
   - 1.3. Considering and addressing the individual needs of key species.
2. **Integrate action across all land types, use and ownership through the incorporation of connectivity considerations into the management of all issues discussed in this policy paper. Key issues include:**
   - 2.1. Community participation to involve all landholders and improve connectivity in public spaces;
   - 2.2. Managing domestic animals so the use of urban public space, front gardens or nature strips as habitat or movement corridors is not interrupted;
   - 2.3. Conserving mature trees across the landscape so that they can be used as stepping stones and refuges for the dispersal of various plants and animals; and
   - 2.4. Managing waterways to allow for aquatic and riparian permeability.
3. **Maintain and enhance existing connectivity by:**
   - 3.1. Undertaking habitat recovery actions in key locations such as areas of potential linkage between existing ACT Nature Reserves and those in NSW;
   - 3.2. Avoiding further fragmentation, especially for threatened species and threatened ecological communities such as Yellow Box-Red Gum Grassy Woodlands or Natural Temperate Grasslands;
   - 3.3. Utilising innovations such as fish ladders or kangaroo underpasses to overcome obstacles to connectivity such as dams and roads; and
   - 3.4. Designing landscaping, such as that described in *Our Experience Edge Friendly Plantings at "The Fair North Watson* (p 22), which incorporates;
     - 3.4.1. native plants in a range of species and age classes to provide cover, food and shelter for wildlife; and
     - 3.4.2. rocks and coarse woody debris to provide habitat and shelter for frogs and reptiles and a source of foraging for small woodland birds.

References and Further Reading

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Domestic Animal Management

Principles

Introduced predators such as cats and dogs are a threat to ecological values.

Sensitive fauna and conservation habitats abutting suburbs and housing developments should be protected from the impacts of domestic animals.

Restricting the ability to roam has benefits for the health and welfare of domestic animals.

Policies must be sensitive to the high social value of pet ownership within the ACT.

Restrictions should be placed on domestic animals that have the potential to threaten biodiversity in natural areas.

Significance

Domestic animals such as cats and dogs put significant pressures on native ecosystems through predation and through the spread of diseases and weeds. Many dogs, for example, chase wildlife such as kangaroos and reptiles. Even where they do not hunt successfully, the predatory activity and their scent can cause extreme stress to animals.

The predatory behavior of cats is also of significant concern. Studies, both locally and nationally, show that free-roaming domestic cats prey on a large range of native fauna, and can significantly suppress populations of birds, animals and reptiles, especially impacting on species with small populations such as threatened fauna. For instance, a Canberra study (Barratt 1998) found that 75% of all domestic cats hunted opportunistically. The cats studied preyed upon 67 different species, a range of which were native species including birds, reptiles, amphibians and small native mammals. Barratt (1998) concluded that the proportion of native species taken by cats would increase with proximity to natural environments.

Cats and dogs also perform a transport role in the transfer of invasive plant species and diseases from urban areas into areas of ecological value. The seeds of some invasive plant species may be caught in fur and paws and spread as the animal travels. Similarly, domestic animals can transmit diseases such as Toxoplasmosis and tapeworm to native animals.

The presence of cats and dogs undermines the conservation objectives of areas of ecological value such as nature reserves. In particular, permitting dogs in nature reserves demonstrates a prioritization of recreational objectives over conservation objectives in park management. This detracts from the recognition of conservation values in planning, management and public perception.

It is also important to recognise the benefit to animals and their owners in keeping domestic animals either restrained or away from areas of ecological value. Cats and dogs which roam freely within areas of ecological value are susceptible to attack from snakes, kangaroos and other domestic animals. They are also at risk of consuming poison baits, becoming lost, and

contracting exposure and disease. Some of these diseases, such as the fox-bourne tapeworm *Hydatids* can even transfer to humans.

Existing Situation

The *Domestic Animals Act 2000 (ACT)* provides a number of mechanisms for the identification and registration of domestic animals as well as outlining the duties of owners, carers and keepers. These mechanisms in turn minimise the impact of domestic animals in areas of ecological value.

During the past decade, domestic animal management policies and strategies have improved significantly. The *Domestic Animals Act* requires dogs to be restricted on a leash unless within designated off leash areas or dog parks. The Act was amended in 2007 to include a similar provision for cats. It empowers the relevant Minister, currently the Minister for Territory and Municipal Services, to declare a cat curfew in a particular area if there is a serious threat to native flora and fauna posed by cats [s.81]. Declarations have been made in several new suburbs including Forde, Bonner and "The Fair" at North Watson. To date all 'curfews' have been for a period of 24 hours. This requires cats in designated suburbs to be kept inside domestic houses or appropriate outdoor enclosures at all times. The owner of a cat is in breach of the *Domestic Animals Act* if the cat is not confined to the premises of a keeper or carer [s.82]. Si

In a further move forward, formal dog parks have been established in Greenway, Yarralumla, Belconnen, Forde and Casey. These establishments provide an appealing option for allowing dogs off leash and draw recreational pressure away from conservation areas. Maps of declared dog on and off leash areas have been made publically available on the Territory and Municipal Services website. Signage has also been erected at many of the entrances to nature reserves informing users that dogs are to be kept on leash. Several areas of significant ecological values, such as the Mulligans Flat Nature Reserve have also been declared no dog zones.

Our Experience

Laying Down the Law in North Watson

"The Fair" North Watson has been declared a 24 hour 'cat curfew' area due to its proximity to Mount Majura Nature Reserve. Dogs are permitted within this area, but are required to restrain their dogs on leashes. These conditions provide a good legislative basis for domestic animal management. However, at a focus group held by the Conservation Council in September 2013 found, residents reported that community engagement efforts designed to encourage residents to restrain their animals were significantly undermined by a the observed lack of enforcement of either set of regulations.

The observation of cats and dogs roaming freely throughout the suburb and the nature reserve without any perceived consequence was reported to result in considerable confusion and a disincentive to adhere to the regulations. This was especially true where the regulations required considerable personal expense such as the purchase of outdoor cat containment equipment. Furthermore, because no cat curfew has been declared within the broader Watson area, some of the observed cats within "the Fair" may not be subject to regulation.

The restraint of dogs was reported to be similarly undermined by the observation of users of Canberra Nature Park walking their dogs off leash. Furthermore, frustration was expressed regarding the lack of accessible alternative off-leash areas nearby to "The Fair". The importance of incorporating off leash dog areas into development planning was raised at the initial North Watson Bush on the Boundary meetings. A proposed park area was identified and planned to be developed into a dog off leash area. Once construction had already begun on the development, it was determined within the ACT Government that the park was not an appropriate site for a dog off leash area. Subsequent investigations were initiated into alternative sites. Eighteen months after occupation began, no resolution of this situation has been achieved and residents have begun to form norms and habits with regard to their domestic animals.

Despite this solid basis, anecdotal evidence from residents, ParkCarers and Park Rangers indicates that free roaming cats and dogs are observed regularly within and adjacent to areas of ecological value. While there have been significant steps forward there remains a lack of enforcement, compliance and strategic consideration of the management of domestic animals in the planning and implementation processes (as described in *Our Experience –Laying down the Law in North Watson* (p 18)). Measures to manage domestic animals such as 'cat curfew' declarations and the establishment of dog parks have thus far been implemented on an ad hoc basis and usually in response to advocacy from community environment groups. This situation is not only inefficient, but may result in situations where sensitive locations are not subject to 'cat curfew' and are not supported by targeted community engagement or infrastructure such as dog parks and catteries.

This situation has lead to considerable confusion for residents, particularly second generation owners and tenants, who have not been subject to initial community engagement efforts (see *Our Experience – Coming Home to the Bush in Gungahlin (p 50)).* It is further compounded where free-roaming cats and dogs from neighbouring areas are observed within areas subject to restrictions such as 'cat curfew'. In addition, the lack of enforcement and strategy gives residents little incentive to adhere to restrictions, particularly where they would require considerable personal expense such as the purchase of cat containment equipment, or where they would be required to travel to allow their dogs off leash.

Pet ownership has high social value within the ACT and any domestic animal polices or measures must be sensitive to this. This does not mean that domestic animal management should be avoided or softened. Indeed, a 2011 study of ACT community attitudes to cats found that:

- 86% of the Canberra community believes there are benefits if cats are contained;
- 58% of the community support cat containment across the ACT, coupled with mandatory registration, with only 21% opposing such a policy; and
- There is very strong community support (84%) for a stray cat control/rescue programme (eg cat shelters, adoption programmes etc).

Given this in principle support it can be expected that addressing the discussed issues with a strategic, community focused approach will help to ensure compliance and acceptance.

Recommendations

1. **Streamline the declaration of 'cat curfew areas' and the provision of dog exercise areas outside of the conservation system by:**
   - 1.1. Instituting an automatic regulation via a standard condition of approval for all new suburbs which requires the declaration of 'cat containment' and the installation of adequate and easily accessible dog off-leash areas and/or dog parks;
   - 1.2. Introducing 'cat curfew' declarations and adequate and easily accessible dog off-leash areas and/or dog parks to existing suburbs on a rolling basis, with prioritization for suburbs directly adjacent to areas of ecological value

2. **Monitor the efficacy of policy measures by:**
   - 2.1. Encouraging community reporting of free roaming domestic animals to domestic animal services;
   - 2.2. Regularly patrolling 'cat curfew' areas and nature reserves; and
   - 2.3. Consulting communities.

3. **Regulations must be enforced in order to be effective, this should involve;**
   - 3.1. The clear establishment of warning systems and fines for non-compliant pet owners, especially in declared 'cat curfew' areas;
   - 3.2. Regular patrolling of Nature Reserves by Park Rangers allowing provision for:
     - 3.2.1.On the spot fines for owners walking dogs off leash in nature reserves; and
   - 3.3. Regular patrolling of 'cat curfew areas' by Domestic Animal Services supported by;
     - 3.3.1.The construction of a cattery at Domestic Animal Services.

4. **Community engagement regarding domestic animal management should;**
   - 4.1. Encourage the public to report free roaming animals to domestic animal services;
   - 4.2. Educate residents regarding the health and welfare benefits of restraining pets; and
   - 4.3. Direct pet owners to viable alternatives such as outdoor cat runs and dog off leash areas and/or or dog parks.

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Invasive Plant Species

Principle

Invasive plants need to be managed proactively, with threats being identified and addressed before they spread.

Known or potentially invasive plants should not be planted close to areas of ecological value.

Significance

Invasive plant species can have negative impacts on habitat quality, biodiversity, and aesthetics. Invasive plants can outcompete and even replace local species, particularly when native ecosystems are already under stress from outside factors such as the urban edge effects discussed in this document. Their spread is also facilitated by these factors, including introduction by domestic animals, soil disturbance through the construction of roads and infrastructure, seed transport on maintenance machinery, changes in fire regimes, increased access and recreation leading to the introduction of plants on vehicle tyres, shoes or through the dumping of garden refuse and direct spread from suburban gardens.

Invasive plant species can also harbour or encourage pest animal species that compete with or threaten native wildlife. Similarly, native species composition can become disturbed when the existence of exotic species benefits one species more than others. For example, the prevalence of exotic winter-berry producing plants in home gardens has facilitated the survival rate of young Pied Currawongs (*Strepera graculina*). The adult Currawongs then increase their predation on the nests of small woodland birds, many of which are rare or threatened in the ACT.

Existing situation

ParkCare groups and Territory and Municipal Services work hard on weed control. Nevertheless, weed control is expensive, time consuming and often has limited effectiveness, particularly when budgets and priorities are variable. While actions to control existing invasive plants are essential, it is equally important to reduce the spread of new and existing invasive species into areas of ecological value. The management plan of the Canberra Nature Park (DUS 1999) recognizes that "one of the greatest potential sources of new weed invasion is from horticultural plants escaping from suburban gardens adjacent to [Canberra Nature Park]" (DUS 199:35). This means that the avoidance of known or potentially invasive species in urban landscaping is critical to strategically reducing the problem.

The key guiding legislation for invasive species is the *Pest Plants and Animals Act* 2005. The associated Declaration *Pest Plants and Animals (Pest Plants)* 2009 No:1 lists the declared pest plants of the ACT. The declared plants are required to be actively managed according to the categories of notification, suppression, containment and prohibition. Because all plants require action and management plans, some plants that are considered invasive elsewhere, but have not yet become problematic in the ACT, and some plants which are already common in the ACT are excluded. Some of these plants may become a significant threat if they become introduced into areas of ecological value.

Because these plants are not declared pest plants, and many of those that are have not been prohibited, they are often readily available for purchase. Some of these plants, such as Morning Glory (*Convovulus cneorum*) are regularly included in the landscaping of new developments due to their hardy nature. Others, such as the known ACT escapee Rosemary Grevillea (*Grevillea rosemarinifolia*) are issued free to the owners of newly built homes through the Yarralumla Nursery as part of a the Act Government 'Free Plant Issue Scheme' to preserve our 'garden city'. This means that known or potentially invasive plants are being planted close to areas of ecological value.

Several different lists and brochures, many of them endorsed by the ACT government have been created by various groups in an attempt to combat this issue such as "Are your garden plants going bush?" by the Australian Native Plants Society, "Grow me Instead" by the Nursery & Garden Industry" and the "Molonglo Catchment Weed Information Pack" by the Molonglo Catchment Group. New developments such as that described in *Our Experience – Edge Friendly Plantings at "The Fair" North Watson* (p 22*)*), have already created localised lists that identify plants to be avoided and plants to be encouraged. Appropriate plants to be encouraged were adapted from the planting list developed by BoB Molonglo and plants to be avoided were based on the experiences of the local ParkCare Group.

Our Experience

Edge-friendly planting at 'The Fair'

The development of "The Fair" at North Watson is quite unusual in that it was not only landscaped prior to the residents moving in, but it also has ongoing landscaping and maintenance under a Community Title Agreement. This situation means that if a resident wishes to alter their front garden, they are required by contract to have their plans approved by the Community Title Manager.

In an effort to avoid the spread of invasive plant species and improve connectivity with the adjacent Majura Nature Reserve, the North Watson Bush on the Boundary group reviewed the initial landscaping design, including its planting list. There were several replacements made to favour locally endemic species and remove potentially invasive plant species. Unfortunately, there were some issues with version control that resulted in incorrect plantings and the necessity of physically removing and replacing plants.

Before the approval of "The Fair" development, the Environment Protection Authority had recommended that woodland trees and shrubs grown from locally sourced seed be grown adjacent to the Majura Nature Reserve and in open areas within the site, the retention of "all high value, and where possible medium value trees, especially the old growth trees" and the avoidance of known invasive species. Had these recommendations been addressed at an earlier stage of development or made compulsory, for example by attaching conditions to the Development Approval, the ongoing need to replace weed species in North Watson may not have occurred.

To solve this issue, and to ensure the continuation of ecological considerations in future landscaping at "The Fair", BoB members and the landscapers collaboratively created a list of acceptable and not acceptable species. The list was incorporated into Community Title Management as a reference point for approving resident alterations and designing future landscape changes. A short and accessible version was provided to residents as a part of their community engagement kits.

Recommendations

1. **Review the declared Pest Plants under the *Pest Plants and Animals Act 2005*:**
   1.1. in consultation with ParkCarers and Catchment Groups to determine which species are invading; with a view
   1.2. to develop a further category which identifies plants as potentially invasive and bans their sale, propagation or purchase as a precautionary principle but does not require action on existing plants. The destruction, notification or containment of all existing plants may be impractical and be met with public resistance.
2. **Create an ACT wide list of plants to be avoided near areas of ecological value and of local species which should be used to replace them and incorporate this into:**
   2.1. future landscape planning located nearby to areas of ecological value;
   2.2. the upcoming review of 'The Urban Design Guidelines for Urban Infrastructure - 23 Plant Species for Urban Landscape Projects"; and
   2.3. community engagement projects, with a particular focus on point of sale such as 'The Free Plants Scheme' issued through Yarralumla Nursery.
3. **Engage residents regarding the impacts of invasive plants and alternatives to their use in residential gardens.**

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Fire Management

Principles

Ecological assets should be protected alongside lives and property.

Asset Protection Zones should be incorporated within the urban footprint of the development wherever possible

Asset Protection Zones should be located outside areas of ecological value where there is a risk that hazard reduction measures will impact on those values.

Significance

Fire management is undertaken for two primary reasons, (a) to enhance and maintain ecological values and (b) to reduce the risk of bushfire damage to assets. In areas where the urban edge abuts areas of ecological value, the need to manage these two objectives simultaneously becomes more vital. Depending on factors including environmental conditions and proximity to assets a range of fire management techniques may be employed. These include no action, controlled burns, slashing, grazing, removal of woody debris and/or the installation of fire management infrastructure. Where these actions are undertaken for the primary objective of bushfire hazard reduction, they may pose risks to environmental values. For example, when controlled burns are undertaken at regular intervals to reduce fuel loads, they may change the fire regime within the managed area. This has the potential to significantly alter the ecosystem, for example by eliminating plants which are sensitive to changes in fire regimes (the frequency and intensity of fires). By contrast, the total elimination of fire within an area, may negatively impact on species that rely upon regular fire in order to propagate. Other types of hazard reduction also have the potential to impact on ecological values such as those that involve removing rocks and preparing the site for slashing. These activities may destroy habitat and shelter for insects, lizards and small mammals. Similarly, associated fire management infrastructure, such as access points or roads, can have negative impacts such as erosion or compaction, as described in *Our Experience – Fire Access at "The Fair" North Watson* (p 25).

Existing situation

Canberra has a long history of bushfire occurrence and an urban edge that abuts an area of ecological value may poses a particularly high risk to lives and property. As a consequence the *ACT Strategic Bushfire Management Plan* imposes strict management guidelines in the area adjacent to the urban edge, referred to as the Ember Zone. This management occurs within Asset Protection Zones. The Inner Asset Protection Zone extends from the Ember Zone to a distance of 10-30 metres, and the Outer Asset Protection Zone extends beyond this to a distance of 100 – 300 metres depending on the vegetation type and associated fire risk. This means that hazard reduction activities can occur on perimeters up to 330 meters wide.

In the past, Outer Asset Protection Zones have regularly been designated within areas of ecological value. This situation has begun to change in recent years with the development of Molonglo. The Molonglo NES plan requires an Outer Asset Zone to be located outside the Kama Nature Reserve in order to protect its nationally significant ecological values. This is laudable but a lack of clear policy in this area means that these issues must be renegotiated with each new

development proposed next to an area of ecological value, resulting in conflict and projected profit loss, as described in *Our Experience - Renegotiating Asset Protection Zones in Coombs - Molonglo* (p 26). Similarly, many new suburbs have incorporated edge roads into planning. As a consequence, backyards do not directly abut areas of ecological value and fire risk is reduced.

Our Experience

Fire Access at 'The Fair' – North Watson

The Fire Management Plan for "The Fair" development in North Watson required the installation of fire access gates to the Mount Majura Nature Reserve. While these gates were installed as required, several of the access areas were unsuitable for fire truck access. Furthermore, the developer was only required to install temporary mitigation measures to reduce negative impacts on the access areas such as erosion and compaction. As a consequence, severe erosion has been observed at the sites following rain.

Asset protection zones have traditionally been designed to protect lives and property. A significant change in the 2009 *ACT Strategic Bushfire Management Plan 2009* was the recognition of the importance of protecting environmental assets. This is a good step forward, as is the ACT Government's *Ecological Guidelines for Fuel and Fire Management Operations* that give specific advice on protecting ecological values during bushfire hazard reduction measures. These documents demonstrate that even where Asset Protection Zones already exist within areas of ecological value, flexibility in approach can mean that impacts are minimised without necessarily compromising the protection of lives and property.

There are numerous pressures on managers that may influence the degree to which these guidelines are adhered such as time or economic constraints, and the higher value placed on urban asset protection requirements. Furthermore, anecdotal evidence suggests that community perceptions regarding the need for fire management often demands visible and substantial action, which may preclude ecological conditions such as a preference for slashing over burning or the need for patchy fire mosaic patterns. This factor suggests a need for community education regarding ecological considerations in fire management.

There is a similar need for community participation in reducing fire risk. The *ACT Strategic Bushfire Management Plan* identified that suburban fuels caused 50% of house losses in Canberra's 2003 bushfires and that the majority of fire ignitions had human causes. Addressing this situation would suggest a requirement for diverting a considerable percentage of the energies directed toward bushfire hazard reduction to working with communities to reduce fire ignitions and the fuel load within the Ember Zone itself. This need for community participation is recognised within the *ACT Strategic Bushfire Management Plan 2009*.

This does not mean that ecological fuel reduction is not a significant concern. Studies by Gibbons et al (2012) demonstrated that having less than 5% tree and shrub cover within 40m of houses and no groups of trees and shrubs within 100m were likely to be two of the most effective methods of reducing house loss and was considerably more effective than broadscale ecological fuel reduction. Asset Protection Zones are consequently an essential element of fire management, underscoring the importance of managing them optimally. The most effective way to achieve this is to locate them outside of areas of ecological value, so that all necessary action can be undertaken without compromise.

Our Experience

Renegotiating Asset Protection Zones in Coombs - Molonglo

The Development Application for the suburb of Coombs in Lower Molonglo located significant parts of the Outer Protection Zone in the Molonglo river corridor. Some of the affected areas also fell within the habitat of the nationally listed vulnerable endangered Pink-tailed Worm-lizard (*Aprasia parapulchella*). This application did not detail the intended hazard reduction measures for this area.

The Pink-tailed Worm-lizard lives under rocks in grassland, grassy woodland and woodland communities (Wong et al 2011). This meant that there was a risk that hazard reduction activities could impact on the habitat of this significant reptile, for example in the removal of habitat rocks in order to prepare the area for slashing. In an effort to reduce the likelihood of these impacts, the Conservation Council ACT Region appealed the decision of ACTPLA to approve the Development Application in the ACT Civil and Administrative Tribunal (ACAT) during 2011-12. An agreement was reached at the mediation stage with the Land Development Agency agreeing to remove the Outer Asset Protection Zone from the Pink-tailed Worm-lizard habitat, until the matter could be further considered in the Statutory Plan of Management for the River Corridor.

As a solution to this difficult situation, the ACT Government is investigating innovative management techniques which have the potential to protect human assets while not only maintaining but also potentially enhancing the habitat of the Pink-tailed Worm-lizard.

Recommendations

1. **Government policy should require Asset Protection Zones to be located outside areas of ecological value where there is a risk that bushfire management techniques could impact on those values.**

2. **Land development proposals and considerations of their profitability must be based on the provision for Asset Protection Zones outside areas of ecological value, where there is a risk that bushfire management techniques could impact on those values.**

3. **Site developers should complement Asset Protection Zones with other fire management provisions such as perimeter roads, appropriate access for fire fighting equipment and landscaping.**

4. **Community participation programs should:**
   4.1. educate residents regarding ecological considerations in fire management; and
   4.2. facilitate individual and community action to reduce suburban fuels and human ignitions.

5. **Where fire management does occur in areas of ecological value, it must be in accordance with measures to protect this value. These measures should be based on the best available science and innovation regarding not only the fire response of the ecological value at hand, but also the likelihood of other impacts such as erosion or compaction. The efficacy of this management should be monitored.**

References and Further reading

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Mature Trees

Principles

Mature trees, and their associated vegetation, have significant ecological values which should be retained where possible.

The continuation of mature trees in the landscape requires the retention and planting of trees in a range of age classes.

Mature Trees need to be identified early and managed before, during and after development.

Significance

Mature trees, and their associated vegetation, are considered keystone ecological structures. This means they have an essential role in the ecosystem at a landscape scale. As such, the number of mature trees can have a marked effect on the number and range of native species that can co-exist with humans in the urban environment. This keystone nature of mature trees enables them to provide "stepping stones" for some species across largely cleared landscapes. This role is vital to addressing connectivity issues.

Mature trees support a range of associated vegetation. By providing shelter, food, nesting opportunities and movement corridors, these structures in turn support a range wildlife. For example, the hollows that form on mature trees and dead trees, are critical for the survival of over 300 species of native animals, including various species of bats, birds, possums, gliders and reptiles (Gibbons 2002). These hollows can take 100- 200 years to form. This means that once a mature tree is lost, it will take more than a century to replace. As a consequence, many of these species are threatened, as described in *Our Experience – Supporting the Superb Parrot* (p 28).

Existing situation

The *Tree Protection Act 2005* regulates damage to large mature trees on leased land, and regulated or registered trees. The ACT Government designs and implements Tree Management Plans for all registered trees to individually manage their health and longevity.

While this is a good basis, the *Tree Protection Act 2005* neglects consideration of the retention of mature trees into the future. That is, immature trees that have the potential to grow to a large size are allowed to be damaged or removed. Noting that regardless of how well they are protected, trees have a limited natural

Our Experience

Supporting the Superb Parrot in Harrison

The Gungaderra Heritage Lane in Harrison is a good example of retaining mature trees along a creek line and old heritage road, which functions as a movement corridor for Superb Parrots and other wildlife through the suburb and into the nearby Goorooyararoo Nature Reserve. The lane also provides a lovely recreation space for residents.

lifespan, this situation means that as mature trees and their associated values are lost, they are not necessarily being replaced in the landscape.

Furthermore, there is no provision in the *Tree Protection Act 2005* for the protection of trees which are on public land such as reserves, nature strips and land designated for future development, unless they are registered. This means that there is no requirement to retain mature trees in the public landscape or during urban development and that they may be removed during development as described in *Our Experience – Lost Opportunities at Crace* (p 29).

Our Experience

Creating an Urban Forest in Forde

The Forde development adjacent to the Mulligan's Flat Nature Reserve, retained many large mature eucalypts within adjacent parkland or walking paths. This measure increases the connectivity between the reserve and the new suburb whilst also providing important habitat and a sense of local bush character. Forde is now considered a highly desirable investment and place to live.

An exception to this is the provision in the *Environment Protection and Biodiversity Conservation Act 1999* for the protection of trees that are threatened species, form part of threatened communities or provide habitat for threatened species. If the proposed development will impact on a registered tree, the *Planning and Development Act 2007* requires its referral to the Conservator for Flora and Fauna and the creation of a Tree Management Plan.

Our Experience

Lost Opportunities at Crace

Many eucalypts over 100 years were lost during the development of Crace. This resulted in lost opportunities to retain ecological values such as habitat, connectivity and visual amenity within the suburb.

While many are destroyed during urban development, there is an increasing tendency to retain a few key mature trees in the new landscape as demonstrated in *Our Experience – Creating an Urban Forest in Forde (p 29)*. The is a positive change, however, unless they are registered trees under the *Tree Protection Act 2005* they are not subject to Tree Management Plans and subsequently do not have adequate provisions for managing their health and longevity. This means that they may die or be removed well before their natural lifespan.

Unhealthy trees, old trees, or trees which grow beyond their allocated space, are not aesthetically pleasing and present a danger to lives and property. At this stage even regulated or registered trees can be removed under the *Tree Protection Act 2005*. The consequence of this is that for many trees that are retained in development, their loss is delayed rather than averted.

Finally, the *Tree Protection Act 2005* considers trees as stand alone structures. Similarly, the retention of mature trees during developments is regularly achieved without its associated vegetation. The vegetation is often removed and replaced with bark chips or new, less established and complex plantings. This approach neglects the importance of remnant associated vegetation in retaining the health and ecological values of mature trees.

Recommendations

1. **Retain the health and longevity of mature trees by:**
   1.1. registering those which have significant ecological value according to the *Tree Protection Act 2005;* and
   1.2. designing and implementing Tree Management Plans that consider current and future needs and avoid potential impacts on lives and property.

2. **Retain the ecological values of mature trees by:**
   2.1. conserving clumps of trees and trees which can be used as stepping stones to enhance connectivity;
   2.2. protecting the associated vegetation; and
   2.3. retaining hollow-bearing trees and trees which are used by endangered species for nesting, feeding or movement corridors.

3. **Ensure the continued existence of mature trees in the future by;**
   3.1. retaining trees in a range of age classes; and
   3.2. allowing for regeneration or planting new trees in appropriate locations for their health, longevity and ecological values.

4. **During new urban developments manage mature trees by:**
   4.1. undertaking an early and thorough assessment of their role of within a whole of landscape context; and
   4.2. planning urban infrastructure and design around their health, longevity, ecological values and continuation.

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Rural Leases

Principles

Rural Leaseholders should be given the opportunity to be involved in decision-making processes that affect their land.

Rural Leaseholders should be supported in protecting and enhancing the ecological values on their land, with particular consideration for managing urban edge effects.

Where the urban edge approaches rural land with environmental value, urban edge principles should guide management action.

Significance

Rural Leasehold land often has significant ecological values. They may contain threatened species, endangered ecological communities, have high habitat values for plants and animals or retain connectivity values. Urban edge effects put extra pressures and expenses on rural lessees in managing their land. Unfortunately, uncertainties about the development cycle, particularly whether their land will be acquired, pose a challenge and a disincentive to sustainable land management. While many leaseholders are motivated enough to continue best practice, they risk running at a loss if they are not careful.

Existing situation

Many ecological values exist outside of reserves and other protected areas. For example 13% of threatened species and 21% of critically endangered species Australia-wide exist outside of reserves (Watson et al 2011). Where urban development encroaches on unprotected ecological values such as these, specific management actions are required to address the issues discussed in this policy document. The creation of new reserves requires significant initial and ongoing funding and resources, which may not be available. This means that reservation it is not always the best option. As a consequence, the protection and enhancement of ecological values on a landscape scale requires off-reserve conservation and management.

Our Experience

Protecting Earless Dragons in Jerrabomberra

In the Jerrabomberra Valley, Conservator's Directions have been applied to leases that contain populations of the endangered Grassland Earless Dragon and the endangered Natural Temperate Grassland Community. The Directions allow for a higher level of protection for conservation values through the application of restricted activities. Unfortunately the efficacy of these Directions is unknown because the results of any monitoring and evaluation exist within documents which are in confidence.

Our Experience

Keeping down the weeds in Aranda

The Friends of Aranda Bushland (FOAB) have spent twenty years removing weeds, controlling erosion and planting local species in the Aranda Bushland/Snow Gums heritage area. One of the major problems in weed control is the spread of weeds from the adjoining rural lease into the nature park area. The western rural lease paddock was formerly used for horse agistment, but has been unoccupied for several years. It is heavily infested with Patterson's Curse, which is highly poisonous to horses, and St. John's Wort, also poisonous and invasive.

FOAB complained to the Commissioner for the Environment and Sustainability on the absence of weed control on the lease land. An extensive reply was received, after discussion between the Commissioner and ESDD and TAMS.

The lack of transparency on Land Management Agreements, and the apparent absence of implementation of what they purport to contain, make complaints on weeds to ACT Government Departments difficult. Nevertheless, FOAB was pleased that the Commissioner's response to their complaint resulted in PCL employing a contractor to spray St. John's Wort on the rural lease area, which was well done and effective.

Because many ecological values exist on rural land, the management of rural leases is an important part of off-reserve conservation and management. This situation requires the sensitive balancing of the requirements of ecological systems with the needs of the leaseholder. The edge effects arising from urban areas place considerable extra costs and pressure on rural lessors in managing the ecological values on their land. These can include trespassers, domestic animals, weeds, waste dumping and increased native herbivore grazing. Furthermore, the impacts and uncertainties that are associated with new developments, such as the possibility of land acquisition, can provide a disincentive to invest in sustainable land management techniques.

Conservator's Directions and Land Management Agreements provide existing measures for the protection of lands, while still allowing for the continuation of primary land use as described in *Our Experience – Protecting Earless Dragons in Jerrabomberra* (p 31). Under Part 7 of the *Nature Conservation Act*, the conservator has the power to provide directions to the occupier of land for the protection of native plants, animals and timber that exist upon that land. These directions are associated with time limits and penalties for non-compliance. Land Management Agreements, which are required for all rural lessees under the *Planning and Development ACT 2007* (ACT), are often used as the enabling instrument for implementing these directions. These are reviewed every five years.

Whilst Conservator's Directions and Land Management Agreements are a good step forward, there remain concerns with monitoring, transparency and enforceability, as Described in *Our Experience - Keeping down the weeds in Aranda* (p31). Furthermore, many rural lessees have had difficulty in finding the capacity to meet their obligations. There is also concern regarding the inability for conservation minded leaseholders to voluntarily opt into these measures to protect the ecological values on their land.

The option of Conservation Covenants with local councils or governments is available to rural lessees in several other states, such as the NSW system of Conservation Agreements. These allow leaseholders to voluntarily alter the title of their land so that conservation measures on all, or part, of their land perpetuate beyond individual leaseholders. The management requirements

associated with these measures are separate to the title so that they can be updated regularly to reflect best available science. In an effort to assist with the extra demands required in managing land for conservation, landholder support, management advice and tax exemptions and concessions are usually made available.

Annual payments for up to 15 years are available to support long-term measures such as these, through the national 'Caring for Country' Environmental Stewardship Program. Unlike other similar programs, the Environment Stewardship Program has developed a cost–effective and comprehensive monitoring to determine effectiveness, support landholder capacity and inform adaptive management.

The NSW example has the potential to be developed into a system of 'Conservation Leases' in the ACT where rural lessees are provided with sufficient support to voluntarily implement effective long-term conservation management on their land.

Recommendations

1. **Measures for protecting and enhancing ecological values while still allowing for the continuation of the primary land uses should be:**
   1.1. regularly reviewed to incorporate best available science;
   1.2. sufficiently monitored, including base-line studies, to assess effectiveness, allow for adaptive management and ensure a rigorous compliance process; and
   1.3. made publically available, along with monitoring results, to allow for transparency and accountability.

2. **Where rural land with ecological value abuts an urban edge, the potential for applying a Conservator's Direction should be evaluated and implemented where applicable.**

3. **For areas of higher ecological value, the introduction of a system of Conservation Leases (both voluntary and mandatory), based on the NSW system of Conservation Agreements, should be introduced and funded by the ACT Government.**

4. **A state-level Environmental Stewardship Program should be developed and implemented to assist in the costs of retaining areas of ecological value on rural lands, particularly where these values are threatened by urban edge effects. Developers should be encouraged to contribute funding toward the program as part of their offsets.**

5. **Rural lessees should be considered key stakeholders and enabled to participate in development and planning to a degree which reflects this.**

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Roads and Infrastructure

Principles

Planning, design and maintenance of roads and other infrastructure should take into account ecological values, constraints and opportunities for the lowest possible impact on the natural environment.

Impacts on ecological values occur both during the construction phase and through ongoing operation and existence.

Infrastructure developments should not be located within areas of high ecological value where there is a risk of compromising those values.

Significance

The construction, operation and placement of roads and infrastructure can impact significantly on the ecological values of the site and adjacent land. The construction phase has the potential to destroy vegetation and damages habitat for wildlife. There is also the potential for air-borne or water-borne waste and pollutants to impact upon adjacent land reducing its ecological functioning and directly affecting plants and animals. Clearing vegetation removes habitat, alters water flows and in turn can lead to eroding soils. Fences and roads can also affect connectivity across the landscape as described in *Our Experience – Kangaroo grazing at Mount Majura Nature Reserve* (p 14).

The ongoing use and operation of roads and infrastructure can continue to have impacts on connectivity from its construction to future use. Ongoing operation also requires the protection of property and users, which often requires regular vegetation management or removal and may require bushfire risk management, which can alter fire regimes. The existence of roads and infrastructure also facilitates increased public access that can result in high impact activities such as littering and off-road driving. This increased access combined with the removal of remnant vegetation and changes to fire regimes can also encourage the growth and spread of invasive species.

Our Experience

Sending power underground

Many new developments in Canberra are opting for underground powerlines, primarily for aesthetic reasons and the reliability of power during storms. These engineering solutions may also have considerable environmental benefits. Overhead powerlines require the alteration or removal of adjacent vegetation, particularly large mature trees, and regular fire control. This has flow on impacts on connectivity, species composition and the prevalence of invasive plant species.

The alternative installation of underground powerlines may have an initially greater impact on the environment by removing vegetation as well as disturbing rocks and soil. However, unlike overhead powerlines, they are less at risk of fire or damage and the site has greater potential for restoration. The potential to replace existing powerlines with underground versions is an issue of debate in the Canberra community. It may raise house values by 3%, but is also likely to cost homeowners several thousand dollars.

Our Experience

Paving the way for Gundaroo Road

During the development of Bonner, the ACT Government prepared a proposal to upgrade Gundaroo Road, from the new suburb to the ACT border. The initial design provided for a dual carriage way combined with significant earth-works to remove bends and even out the road surface. This would have required the removal of over 100 trees and major changes to road batters. The overall impact of this work would have been to seriously impact on Mulligans Flat nature reserve through which the road passed. The reserve is intended to protect one of the largest, last remaining pieces of Yellow Box Red Gum Grassy Woodland left in Australia. The road, if built to the initial design, would have severely affected animal movements across the road and through the canopy and exacerbated already poor drainage flowing into the reserve.

Several community and Government groups entered into discussions with ACT Roads about the proposal and through a collaborative and consultative process a new design for the road was negotiated. The road, as now built, provides for the required transport access, while at the same time construction impacts were reduced to an acceptable level that protected the nature reserve. The road also provides for and enhances connectivity for kangaroos and other animals. The improved design greatly reduced the required earthworks and number of trees removed, and improves drainage of storm-water. The cooperation by all parties led to an unusual conclusion, in that no environmental impact assessment was required under ACT and Commonwealth legislation, it was a win-win outcome for all involved.

A key to this positive outcome was the willingness of the proponent (ACT Roads) to consider and work on new and innovative option. Another key element was the suggestion by an independent engineer, contacted by community groups to install a small roundabout on the ACT/NSW border. This measure slowed traffic from NSW and was complemented by regular messages to remind drivers that the road is adjacent to a nature reserve and that wildlife also use it. Construction works were greatly helped by close liaison between the contractors and the ACT Parks and Conservation Service rangers who identified key roadside vegetation that needed protection, kangaroo crossing routes and opportunities to mitigate impacts.

A project reinforced the critical importance of:

- early consultation with all stakeholders and establishing a measure of trust in their professional, technical and environmental credentials
- providing opportunities to identify issues and options (however unlikely or unusual), and understanding of the requirements of other parties (e.g. safety, construction practicalities, ecological assets and unseen processes) and
- all parties providing sufficient time for a consultative process to be worked through, particularly where this involves the voluntary contributions of the community.

Existing situation

Proposed developments which are considered likely to have significant adverse environmental impact on (amongst other things) a matter protected under the *Nature Conservation Act 1980* are required to refer the project to the ACT Government (Environment & Sustainable Development Directorate), for consideration under the ACT *Planning and Development Act* 2007. Furthermore, if a project is considered likely to have a significant impact on a matter of National Environmental Significance (of which one is 'Listed threatened species and ecological communities'), the proponent of the action is required to refer the project to the Commonwealth for assessment and approval under the *Environment Protection and Biodiversity Conservation Act 1999.*

Notwithstanding assessment under environmental legislation, some roads and infrastructure are located within areas of very significant ecological value. Unfortunately, some natural areas are considered as "empty spaces" in which to locate vital support systems for cities and towns.

The *Environment Protection Guidelines for Construction and Land Development in the Act (EPA 2011)* expands on the provisions of the *Environment Protection Act 1997* and the *Water Resources Act 2007* to guide design, construction, operation and maintenance. The primary focus of this document relates to pollution including air, water and noise. There are similar provisions within the *Waste Minimization Act* 2001 and the *Building Act 2003* to reduce industry waste during construction and to process and contain it on site, where practicable. This attention to waste and pollution is positive, however there are concerns with compliance. Furthermore, waste and pollution form only one part of a range of direct and indirect impacts.

There are innovative design and engineering solutions which can be used to minimize the impacts of roads and infrastructure such as those described in *Our Experience – Kangaroo Grazing in Mount Majura* (p 14) and *Our Experience – Going with the flow in Amaroo Group Centre* (p 45). While the use of these solutions is increasing, they do tend to have a high initial expense which often acts as a deterrent as described in *Our Experience- Sending power underground (p 35)*. Avoided ongoing costs of managing or losing ecological values must be considered in these assessments.

Recommendations

1. **Design new roads or infrastructure to minimise impacts on ecological value by:**

   1.1. exhausting every alternative to locating it in within areas of high ecological value;

   1.2. utilising innovative engineering and design solutions to address issues related to water, fire management, invasive plants, access, mature trees and connectivity; and

   1.3. building the cost of ecological management into construction and operation budgets. These costs could be paid by the proponent as part of an annual license fee to the land manager.

2. **During construction minimise impacts on ecological values by:**

   2.1. implementing impact prevention measures before undertaking works e.g. using fences and erosion guards to prevent the leakage of waste and pollution (including noise and runoff) to adjacent areas; and

   2.2. audit and enforce existing requirements such as those under the *Waste Minimisation Act 2001*, the *Building Act 2003*, the Planning and Development Act 2007 and the *Environmental Protection Act*.

3. **Manage existing infrastructure for its impacts on ecological values through:**

   3.1. active action to restore and retain adjacent ecological values such as weed management, erosion control and appropriate restoration of vegetation cover;

   3.2. controlling public access to the site;

   3.3. using routine maintenance or upgrading works to implement innovative engineering solutions; and

   3.4. explore opportunities for relocation of the facility to areas with lower impact.

References and Further Reading

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Access and Recreation

Principles

Conservation should be a priority over recreation in areas of high ecological value.

Recreation in areas of ecological value should be:

- **passive;**
- **oriented towards furthering appreciation of nature; and**
- **designed in a manner that ensures minimal environmental impact.**

Public access increases opportunities for high impact activities such as firewood collection, waste dumping and off-road driving and trail biking. The potential for these activities to impact on ecological values should be managed.

Significance

Where urban areas approach areas of ecological value, demands and opportunities for public access are significantly increased. Increased public access increases the uptake of recreational activities, such as walking, cycling and dog walking. These activities are beneficial for health and can improve environmental awareness. Unfortunately, in excess, these activities can degrade ecological values by scaring wildlife, spreading weeds and increasing erosion.

Increased access and recreation often results in areas of ecological value being used for illegal activities such as littering and waste dumping, off-road driving and trail biking, running dogs off leash, firewood collection and wildlife poaching. These activities are difficult to monitor and restrict and can result in significant impacts on ecological values.

Our Experience

Waste and wildlife theft at Mount Majura

The Mount Majura Nature Reserve is easily accessed from Watson and Hackett. Regular visitors take advantage of its recreational opportunities by biking, running or walking along numerous trails. Unfortunately, illegal activities associated with this access are having impacts on the ecological values which make the reserve so popular. Mountain bikers are regularly spotted on walking trails, reptiles are often poached and waste dumping has already become evident in adjacent to the recent development of "The Fair". Similarly, cats and dogs are often seen roaming freely within the reserve.

Firewood collection removes trees, leaves, sticks and coarse woody debris that provide habitat and nutrients for a range of plants and animals. Illegal waste dumping and littering spreads invasive species and can entangle or be ingested by native animals. Off road driving and trail biking also spreads invasive species, damages vegetation and degrades tracks and trails making them more susceptible to erosion.

Existing situation

Canberra's urban edge abuts extensive areas of ecological value providing easy public access. Recreation in these areas is valued highly by residents, with Canberran's being the most frequent users of nature reserves in the country (ABS 2013). This close relationship increases public connection to and awareness of the environment but has the potential to result in areas of ecological value being 'loved to death'.

As new developments are created, the urban edge expands further increasing access opportunities and recreational burdens on areas of ecological value. If these opportunities and demands are not sufficiently managed they can lead to increased impacts for example through the informal creation of foot or bike trails along desire lines, which may impact directly on sensitive ecological values such as those described in *Our Experience – Off Road around Black Mountain.* (p 41)

The management plan for the Canberra Nature Park (DUS 1999) acknowledges that high impact activities such as waste dumping and littering are more prolific in easily accessible areas such as those described in *Our Experience - Waste and wildlife at Mount Majura* (p 40). Many of these higher impact activities are currently regulated through legislation. Littering and waste dumping, for example, is illegal under the *Litter Act 2004*. Territory and Municipal Services is responsible for managing the impacts of these activities, regulation and enforcement. Unfortunately, these activities are difficult to monitor and enforce leaving little deterrent to offenders.

To minimise these negative outcomes, there is a need to strategically assess the ACT's current and potential recreational demands and investigate opportunities to minimize impacts and divert the burden to lower- value areas or activities of lower impact. Any such assessment must be done in direct consultation with the community to assess their desires or needs.

Our Experience

Off road adventures around Black Mountain

Black Mountain Reserve is situated directly in the city centre and is an extremely popular location to walk, ride or take in a panoramic view. This popularity is increased by the reserve's high biodiversity. For example, the mountain is home to more orchid species than the entire United Kingdom. Unfortunately, informal trails have proliferated within the reserve, threatening these sensitive orchid colonies along with other important ecological values.

Recommendations

1. **Public access should be limited in areas of particular concern or sensitivity**

2. **During new developments:**

   2.1. opportunities for low impact recreation should be built into overall urban design:;

   2.2. low impact access points to desirable areas need to be identified; and

   2.3. areas that are managed primary for conservation and areas that are to be managed primarily for recreation need to be clearly identified.

3. **Develop an outdoor recreation strategy to guide the provision of recreation opportunities across the entire ACT in a manner that reduces the environmental impact on areas of ecological value.**

4. **Undertake community engagement during any access and recreation planning to:**

   4.1. determine community requirements, desires and motivations; and

   4.2. improve understanding of the reasons behind necessary restrictions.

References and Further reading

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Litter Act 2004 (ACT).

Aquatic and Riparian Areas

Principles

Aquatic and riparian ecosystems should be managed in a manner that enhances ecosystem functioning in terms of flows, quality and aquatic connectivity.

New suburb planning should include the principles of 'water sensitive urban design':

- **Protecting our natural water systems**
- **Managing storm water in ways that improve water quality**
- **Reduces costs**
- **Recycles**
- **Is used for watering vegetation**
- **Minimizes negative impact to natural aquatic and wetland areas**
- **Improves the aesthetic environment**

Significance

Water is critical for the survival of all life on earth, including humans. For many plants and animals, this extends beyond the availability and cleanliness of water to include the environmental flow regimes. Water flow regimes are the rate, amount and regularity of water passing through its course. Environmental flows refer to the basic requirements ecosystems need to function effectively. These flows impact on the rate of erosion, the suitability of aquatic and riparian areas for habitat and connectivity, the cleanliness and clarity of the water and the likelihood of significant damage during unexpected weather events.

The ACT's creeks and watercourses have evolved as slow moving series of ponds. The associated aquatic and riparian animals and plants have evolved to breed, feed and survive within the associated slow environmental flow regimes. These slow moving systems provide the additional benefit of filtering the water, keeping it clean and fresh. When urban areas exist near these watercourses, their flow regimes are often directly or indirectly altered, impacting on the ecological values of the aquatic and riparian areas.

One of the ways this occurs is through the increase in hard surfaces such as driveways, roads, footpaths, concrete channels and drains. Hard surfaces are often smooth and impermeable which means that the speed and amount of water travelling across them is greater than that of soft or varied surfaces such as soil and vegetation. As a consequence when the water reaches a softer area, such as a riverbank, it has a far greater impact and can result in erosion and sedimentation. Furthermore, because this water runs through urban areas, it can collect pollutants and solid waste such as petrol residues, fertilisers and litter and release them into sensitive watercourses.

A similar result can occur in the opposite situation, that is where soft surfaces are increased. This also occurs where surfaces have been altered, for example through the removal of vegetation or the increased acidity of soils during construction. This situation can lead to serious consequences including the removal of topsoil, making revegetation problematic once construction is complete. Topsoil may need to be replaced, as described in *Our Experience* –

Restoring the Molonglo (p 44), which can introduce weeds and chemicals to the ecosystems. Furthermore, the eroding topsoil washes into aquatic areas, increasing sedimentation and impacting on the clarity of the water. Water clarity is important not only for the functioning of the ecosystem but also human health.

More direct impacts can occur even where surfaces and watercourses have been specifically engineered to slow the rate of water passing through. Alterations to watercourse often create unsuitable habitat for animals and plants. When changes are made of a larger or more continuous scale, for example with dams and weirs, the connectivity functions of aquatic and riparian areas can be disturbed, impacting on the resilience of these, and associated, ecosystems.

Existing situation

The ACT has several threatened aquatic and riparian species including the Macquarie Perch (*Macquaria australasica)*, Silver Perch (*Bidyanis bidyanus*), the Murray River Crayfish (*Euastacus armatus)*, Trout-cod (*Maccullochella macquariensis)* and Two-spined Blackfish (*Gadopsis bispinosus)* and Tuggeranong Lignum (*Muehlenbeckia Tuggeranong).* For the survival of these species, aquatic and riparian ecosystems need to meet habitat, breeding and connectivity requirements. This is especially important for waterways that provide key connectivity for aquatic species across large distances such as Murrumbidgee River. Unfortunately, the Murrumbidgee, like many of the ACT's vital aquatic and riparian areas, has become seriously altered and degraded and is at increasing risk as urban areas expand.

Our Experience

Restoring the Molonglo

The development of the Molonglo Valley has the potential to impact on the ecological values of the Molonglo River and its riparian areas. Unfortunately, much of the riparian area has already degraded due to pine plantations and grazing. Nevertheless it still holds significant ecological values and has the potential to be rehabilitated.

Negotiating the ecological requirements of the river and its riparian zones alongside urban development has proved difficult. For example, sewerage systems were installed along the river to facilitate a gravity fed system. However, this resulted in the removal of vegetation and topsoil, resulting in erosion and sedimentation of the river. In order to halt the erosion, rapid revegetation was needed in the short term. Exotic species are cheap and fast growing, however this would have required the replacement of topsoil with commercially imported soil. Commercial topsoil has the potential to introduce weeds as does the planting of hardy and fast growing exotic species. This could have resulted in negative impacts on the biodiversity and habitat values of the area in the longer term. As a consequence, new solutions which balanced short and long term needs had to be investigated.

In order to protect the river corridor whilst simultaneously providing recreational amenities to the new residents, the ACT Government has produced a concept plan for the development of the 'Molonglo River Park'. The plan aims to restore significant sections of the riparian zone and protect threatened species such as the Pink-tailed Worm-lizard (*Aprasia Parapulchella)*. One challenge faced in the design of the Statutory Plan of Management for this area is that of avoiding the potential impacts resulting from increased access and recreational pressures.

Our Experience

Going with the flow in Amaroo

In an effort to demonstrate best practice outcomes, the Land Development Agency (LDA) retained control of the development of the Amaroo Group Centre. In an effort to incorporate the principles of Water Sensitive Urban Design, the LDA is utilising innovative "Strata Cell" technology. The cells are installed within the streetscape and filter storm water runoff. As an additional benefit, Strata Cells will redirect the runoff to irrigate the centre's street trees. The cells will also support the root system of the street trees by providing them with the space, aeration and protection they require for health and growth. Preventative measures such as this are essential to ensuring the survival of trees to a mature age.

This solution has the potential to simultaneously reduce landscaping costs, improve stormwater quality, improve the aesthetic values and safety of the centre by supporting large healthy trees and have improved ecological outcomes for local waterways and tree dependent plants and wildlife. This example demonstrates the potential of new developments to trial solutions which could improve outcomes on multiple fronts.

of efficiently and strategically managing Canberra's water has been recognised for more than a decade as demonstrated by the ACT Government's *Think Water, Act Water Strategy* (2002), the Water Resources Act 2007 and the *Waterways Water Sensitive Urban Design General Code* (2009) (currently under review). These policies recognize the importance of maintaining minimum environmental flows for the health of the ecosystem, using water more efficiently and maintaining water quality. These policies are beginning to take effect as demonstrated by *Our Experience – Going with the Flow in Amaroo Group Centre* (p 45).

This is a vast improvement considering that historically, little attention has been given to the management of the ecological values of aquatic and riparian areas as demonstrated by their absence from the Canberra Nature Park Management Plan (1999). Nevertheless, there is scope for broader application. For example, while some new developments have a deliberate focus on maintaining or improving aquatic and riparian ecosystems, as described in *Our Experience – Restoring the Molonglo* (p 44), others, such as West Macgregor and Jacka, have replaced waterways with drainage lines constructed of rough concrete and rocks.

This is an improvement over the smooth concrete channels exhibited in the older parts of Canberra in that it controls the speed of runoff, however, it remains uninhabitable for many aquatic and riparian organisms and disturbs connectivity. Furthermore, it does little to replace the filtering functions of its natural predecessor. Some locations have developed more natural features to better provide ecological functions, whilst providing aesthetic value such as Bonner. However, older examples, such as the Mackellar Wetlands, have been insufficiently maintained resulting in significant deterioration. This indicates a need for improved management of existing aquatic and riparian areas.

Recommendations

1. **Replace concrete drainage with grassed swales where possible to:**
   1.1. better regulate water flow;
   1.2. improve habitat;
   1.3. reduce hard surfaces;
   1.4. filter pollutants and sediment; and
   1.5. improve aesthetics.

2. **Construct wetlands along urban drains to;**
   2.1. regulate water flow;
   2.2. provide habitat; and
   2.3. filter pollutants and sediment.

3. **Manage aquatic and riparian areas by:**
   3.1. Reducing invasive plant infestations;
   3.2. Retaining adequate ponds and riffle sections; and
   3.3. Retaining and appropriately regulating environmental flows.

4. **Investigate and incorporate innovative solutions to redistribute runoff from hard surfaces such as those described in *Our Experience – Going with the flow in Amaroo* (p 45)**

5. **Prioritise river works, such as in-stream structures, especially for waterways that provide key connectivity across large distances such as Murrumbidgee River. These structures can facilitate:**
   5.1. water temperature regulation;
   5.2. aquatic animal passage (including reptiles and insects as well as fish); and
   5.3. aquatic and riparian plant dispersal.

6. **Ensure sediment and erosion control measures factor in changing flows and extreme weather conditions. These need to be put in place before and during:**
   6.1. construction;
   6.2. ongoing use; and
   6.3. restoration.

References and Further reading

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Community Participation

Principles

Decision-making and planning processes should be transparent and accountable to the community.

Communities should be involved in the decisions that affect them.

Early cooperation and information exchange between key stakeholders will facilitate negotiation and ensure best outcomes.

Community participation should be actively pursued through a specifically designed program where new developments abut areas of ecological value.

Community participation creates a strong sense of ownership, which is essential for effecting behavioural change.

Communities should be educated, consulted and encouraged to participate in dealing with each of the issues presented in this document.

Involving the community in the enhancement and protection of ecological values benefits the community, the environment, developers and government.

Significance

If the community is not enabled to effectively participate in urban planning and in protecting and enhancing ecological values, opportunities are lost and conflict may arise such as that described in *Our Experience – Outer Asset Protection Zones in Coombs – Molonglo* (p 26). This problem is exacerbated when participation opportunities are not provided at the appropriate level. While the vast majority of the community may only require information provision, key stakeholders in the community need to be involved at the decision-making stage.

Through participation, communities gain ownership and have commitment and investment in creating and maintaining positive outcomes. This means that communities are less likely to obstruct actions and more likely to implement required behavioural changes or provide local knowledge and resources. This greatly facilitates and enhances the efficiency and implementation of planning, development and conservation measures.

Conversely, collective experience as well as research by Byron and Curtis (2002) has found that if communities are expected to participate with little support, volunteers and consequently groups can suffer from participation fatigue (burnout) which results in emotional exhaustion, systemic inefficiencies and ad hoc and ineffective management. This indicates that there is a need not only to build strong involved communities but also to support them in their actions without overloading them.

Existing situation

In the ACT, residents, community groups and rural lessees all form part of the "community" which has an interest in and affects the issues that arise at the urban edge. The issue of rural lessees is dealt with more specifically in the previous section: "Rural Leases".

It is the residents who play the core role in ongoing urban edge effects such as those related to domestic animals, invasive plant species, waste dumping, suburban fuels and recreational use. While considerable effort has been put into community engagement in dealing with similar issues in the past, e.g. *The Urban Habitat Guidelines for the ACT* there is still a need for a strategic, targeted and ongoing approach particularly for new developments. It has become increasingly common practice for developers in the ACT to provide community groups with funding to design and implement community engagement programs, such as that described in *Our Experience – Coming Home to the Bush in Gungahlin (p 50)*. These programs have been creative and initially successful, however their effect diminishes once the grant has ended and new residents move in. Furthermore, many programs and their resources have been created anew for each development, which, while it makes for a fresh, targeted approach, tends to be inefficient. Finally, the funding of a community engagement program is not a requirement of development and as a consequence has not occurred in all new suburbs that abut areas of ecological value.

Our Experience

Living on the Edge in North Watson

Community participation regarding "The Fair" development at North Watson was initiated in response to community concerns regarding impacts of the development on the Mt Majura Nature Reserve. A negotiated outcome was achieved where participation could occur at several levels. The Friends of Mt Majura, Conservation Council ACT Region, North Canberra Community Council, Watson Community Association and Watson Woodlands Working Group meet with The Village Building Company and ACT Parks and Conservation Service in the form of a BoB Reference group. The group discusses development planning and implementation and oversees the spending of the agreed funding for the protection and enhancement of ecological values in the Mt Majura Nature Park.

The first part of this funding was allocated to supporting local environment group - Friends of Mt Majura in developing infrastructure and improving ecological values in the park including a new nature trail, weed management and plantings. A second portion of the agreed funding was allocated to the Conservation Council for the purpose of designing and implementing a community engagement program. This program includes tree-planting, sustainability fairs, family days, welcome kits and guidebooks to improve community awareness and ownership over the ecological values of the reserve. In order to mitigate limitations related to longevity, the program also aims to establish strong linkages between residents, local community groups and the body corporate.

Aside from community engagement programs, one way to allow residents to participate in mitigating urban edge effects is to encourage them to join local environment groups, such as LandCare, ParkCare or Friends of groups. As detailed in the recent publication *A Labour of Love*, environment groups have a long and proud history of contributing significantly to the environment and the community. However, as detailed in a combined submission to the *Canberra Nature Park Management Plan*[1], groups and volunteers feel as though they are under a lot of pressure to protect areas of ecological value, with very little support. In order to function effectively groups need human and financial resources as well as access to an open exchange of information. Deficiencies in these areas have resulted in a lack of strategic approach to environmental management within the ACT.

[1] Crawford et al (2010)

Aside from on the ground action, community groups and other stakeholders participate in planning and policy-making. Presently, the community is provided with opportunities to comment on new urban development proposals. Unfortunately, these opportunities are often associated with short time frames, little information and late stages in the development cycle often after decisions have already been made.

Experience has shown that many residents are not interested in engaging in higher levels of community participation. This can result in difficulties recruiting new volunteers or attendance at events. As a consequence, it is also important that communities are provided with the capacity and incentive to participate in urban edge management, but that the success of urban edge management does not rely heavily on high levels of participation. It is important to identify the demographic of the area and the available resources and to provide community engagement opportunities which are suitable to these parameters.

Our Experience

Coming home to the bush in Gungahlin

One of the first developments to fund a community engagement program in the ACT was Forde. Through the BoB Gungahlin, The Conservation Council was able to work with developers, rangers, local ParkCarers and community groups to engage the residents in conservation. Workshops on sustainable and bird attracting gardens were run, ranger led walks were held and information leaflets on the reserves, local frogs and other wildlife were developed. A specific website and newsletter was also developed especially for residents.

Unfortunately, funding for the program was limited. This meant that while engagement on topics such as cat containment for example were initially very successful, anecdotal evidence suggests that with a new influx of residents and no continuing engagement these initial messages have not been carried forward.

Strategic Solutions

Living next to Nature

'Living next to Nature' is the version of this document for urban residents. It is designed to be distributed to existing suburbs on the urban edge and within localised welcome packs for new developments.

Welcome packs distributed to new residents living next to an area of ecological value can be a powerful way of engaging the community in addressing urban edge issues. These packs can include contextualized information to foster community interest and awareness. They can also address each of the issues discussed within this document with particular focus on Connectivity, Invasive plant species, Access and recreation, Domestic animal management and Community participation. Packs can use existing materials that are general to the ACT or have already been created by local community groups, or create new materials to fill gaps.

Recommendations

1. **Invite BoB Reference groups and key community groups such as the Conservation Council ACT Region and Catchment groups to participate in estate development planning at the earliest stage applicable.**
   1.1. Detailed information should be made available at the earliest opportunity so that they can effectively contribute to policy and planning, particularly where new developments are concerned; and
   1.2. Materials that inform development planning should be regularly updated and made available to stakeholders online. These should include ecological and geological maps and reports on development options and constraints.

2. **Encourage residents to participate by joining community groups.**
   2.1. Where new suburbs abut areas of ecological value, Territory and Municipal Services should support the establishment of ParkCare, BushCare, Friends or LandCare groups to assist in caring for them. Assistance should be sought from catchment groups and nearby existing ParkCare Groups recruitment and establishment periods.; and
   2.2. Developers should be required to provide additional funding to environment groups to support start up costs and/or the extra pressures resulting from urban edge effects. An appropriate form of support could be in the form of contributing to the establishment of a bushland management team.

3. **Developers should be required to fund targeted and accessible community participation programs such as that described in *Our Experience – Living on the Edge at North Watson* (p 25). These programs should:**
   3.1. Range in scope from information provision and involvement in on-ground implementation through to consultation and influence over decision-making, as relevant to the situation and goals;
   3.2. Consider consistency and longevity;
   3.3. Provide a range of options to become informed and involved so that they reach the broadest range of people;
   3.4. Be adaptive to the local context, with particular focus on social and environmental dynamics; and
   3.5. Include the design and distribution of welcome packs to residents (*Strategic Solutions – Living next to Nature*) .

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Timeline of Recommendations

Policy Change

1. **Develop an outdoor recreation strategy to guide the provision of recreation opportunities across the entire ACT in a manner that reduces the environmental impact on areas of ecological value.**

2. **Require the following to be located away of areas of high ecological value where there is a risk that they may impact on those values:**
   - 2.1. Asset Protection Zones;
   - 2.2. roads and infrastructure; and
   - 2.3. housing developments.

3. **Develop measures that identify appropriate buffer zones for the urban edge, based upon the best available scientific research.**

4. **Evaluate the ecological values of the ACT on a territory wide basis by:**
   - 4.1. further developing the ACTMapi system; by
   - 4.2. incorporating the accumulated knowledge of local academic research and community groups and commissioning research to fill any gaps; with a view to
   - 4.3. undertaking a broadscale Strategic Assessment of future development.

5. **Review the declared Pest Plants under the *Pest Plants and Animals Act 2005*:**
   - 5.1. in consultation with ParkCarers to determine which species are invading; with a view to
   - 5.2. develop a further category which identifies plants as potentially invasive and bans their sale, propagation or purchase as a precautionary principle but does not require action on existing plants. The destruction, notification or containment of all existing plants may be impractical and be met with public resistance.

6. **Create an ACT wide list of plants to be avoided near areas of ecological value and of local species which should be used to replace them and incorporate this into:**
   - 6.1. future landscape planning located nearby to areas of ecological value;
   - 6.2. the upcoming review of 'The Urban Design Guidelines for Urban Infrastructure - 23 Plant Species for Urban Landscape Projects"; and
   - 6.3. community engagement projects, with a particular focus on point of sale such as 'The Free Plants Scheme' issued through Yarralumla Nursery.

7. **Introduce a system of Conservation Leases based on the NSW system of Conservation Agreements, to enable voluntary protection for areas of ecological value that occur on rural leaseholds.**

Scoping Stage

8. Undertake an early and thorough assessment of the potentially impacted ecological values in the affected and surrounding landscape, including rural leaseholds, which considers at minimum:

8.1. the role of mature trees and patches of remnant native vegetation;

8.2. the presence and demands of (nationally and locally) threatened species and communities;

8.3. aquatic and riparian areas and water flows;

8.4. fire regime requirements; and

8.5. an analysis of connectivity using the mapping available via ACTMAPi and a consideration of the requirements of key species.

9. Identify appropriate locations away from potentially impacted areas of ecological value identified in 8.

10. Register any mature trees which have significant ecological value according to the *Tree Protection Act 2005 and the results of 8, and:*

10.1. design Tree Management Plans that consider current and future needs of these trees and avoid potential impacts on lives and property.

11. Where possible, apply Conservator's Direction to adjacent rural lands where this action is likely to assist in the protection of high ecological values.

12. Undertake community engagement to:

12.1. determine potential requirements and desires of new residents;

12.2. identify and inform key stakeholders of proposal, including adjacent rural leases; and

12.3. address potential objections or considerations.

13. Consider profitability based on:

13.1. the need to address considerations related to the steps above as well as;

13.2. the location of Asset Protection Zones outside of areas of ecological value; and

13.3. the cost of management and restoration of ecological values during construction and ongoing maintenance.

14. Submit a Referral to the Commonwealth if:

14.1. any nationally significant threatened species and communities that have been identified at Stage 8.

Concept Plan

15. Incorporate:

15.1. any requirements from the Commonwealth resulting from Stage 14.

16. Retain key features of ecological values identified in 8 such as:

16.1. mature trees, clumps of trees, "stepping stones" trees and their associated vegetation;

16.2. hollow-bearing trees and trees which are used by endangered species for nesting, feeding or movement corridors;

16.3. vegetation including trees in a range of age classes;

16.4. existing connectivity; and

16.5. ponds and riffle sections in watercourses.

17. Identify:

17.1. areas which are managed primary for conservation;

17.2. areas which are to be managed primarily for recreation; and

17.3. recreational needs and opportunities to meet these in a manner which reduced impacts on ecological values, e.g. the use of dog parks to meet the recreational need to allow dogs off-leash.

18. Limit opportunities for public access to areas of particular concern or sensitivity.

19. Where possible, locate the following outside of areas of high ecological value where they have the potential to impact on those values:

19.1. roads and infrastructure;

19.2. public access routes;

19.3. housing; and

19.4. Asset Protection Zones.

20. Undertake community engagement to:

20.1. determine specific requirements and desires of potential new residents e.g. with regards to access and recreation;

20.2. provide key stakeholders with adequate information and opportunities for input; and

20.3. address potential objections or considerations.

21. Refer the Development Application to the Conservator of Flora and Fauna if:

21.1. any trees have been identified and registered at Stage 8 and 10.

Planning and Design	
	22. Mindfully design landscaping by: 20.1 allowing for regeneration or planting of new trees in appropriate locations for their health, longevity and ecological values; 20.2 using the Tree Management Plans designed at Stage 10.1 to incorporate requirements for ongoing tree health, longevity, and ecological values; and 20.3 creating/ adapting and use a localised list of plants to be avoided near areas of ecological value and of local species which should be used to replace them.
	23. Incorporate opportunities for low impact recreation and access in desirable areas.
	24. Complement Asset Protection Zones with other fire management provisions.
	25. Limit opportunities for public access to areas of particular concern or sensitivity.
	26. Trial innovative engineering and design solutions to address issues related to: 26.1. aquatic and riparian areas; 26.2. fire management; 26.3. invasive plants; 26.4. access; 26.5. mature trees; and 26.6. connectivity.

Construction

27. Undertake baseline studies before beginning any construction or management measures.

28. Implement prevention measures before undertaking works including

28.1. using fences and erosion guards to prevent the leakage of waste and pollution (including via air and water) to adjacent areas; and

28.2. protect mature trees and their associated vegetation according to the Tree Management Plans designed at Stage 10.1.

29. Audit and enforce existing requirements such as those under:

29.1. the *Waste Minimisation Act 2001;*

29.2. the *Building Act 2003;*

29.3. the *Planning and Development Act* 2007; and

29.4. the *Environmental Protection Act*.

Initial Use

30. Comprehensively restore temporarily impacted areas by:

30.1. revegetating cleared areas;

30.2. controlling invasive species; and

30.3. ongoing erosion control and on-site filtration of runoff.

31. Undertake community engagement at the earliest possible stage to:

31.1. Improve understanding of:

31.1.1. local ecological values; and

31.1.2. reasons behind restrictions and management measures.

31.2. Work with existing umbrella groups such as Catchment Groups and Community Councils to provide participation opportunities through:

31.2.1. the development of LandCare/ ParkCare groups; and

31.2.2. the development of community associations.

31.3. Create mindful gardens which:

31.3.1. avoid invasive plant species;

31.3.2. improve connectivity;

31.3.3. reduce fire risk from suburban fuels;

31.3.4. contain domestic animals;

31.3.5. are waterwise; and

31.3.6. retain mature trees.

Ongoing/ Existing Use

32. Maintain and improve ecological values through:

32.1. appropriate fire management based on best available science and innovation regarding not only the fire response of the ecological value at hand, but also the likelihood of other impacts such as erosion or compaction;

32.2. control of public access to sensitive areas;

32.3. using routine upgrading to implement innovative engineering solutions address issues related to aquatic and riparian areas, fire management, invasive plants, access, mature trees and connectivity; and

32.4. reducing invasive plant infestations, particularly along riparian areas.

33. Adaptively manage by:

33.1. monitoring impacts on ecological values and the outcomes of management plans and innovative engineering solutions;

33.2. exploring opportunities for the relocation of infrastructure to areas with lower impact; and

33.3. engaging the public to provide comment and input.

34. Engage the community to:

34.1. Improve understanding of:

34.1.1. local ecological values; and

34.1.2. reasons behind restrictions and management measures.

34.2. Provide participation opportunities through:

34.2.1. the development of LandCare/ ParkCare groups; and

34.2.2. the development of community associations.

34.3. Create mindful gardens which:

34.3.1. avoid invasive plant species;

34.3.2. improve connectivity;

34.3.3. reduce fire risk from suburban fuels;

34.3.4. contain domestic animals;

34.3.5. are waterwise; and

34.3.6. retain mature trees.

35. Explore the potential to apply a Conservator's Direction on any adjacent lands with ecological values.