

## Indigenous Flora and Fauna

**Fact Sheet by Mark Pillsworth posted 17 Jul 2008**

Indigenous flora and fauna needs to be considered/managed as a primary development planning stage, at the beginning of conceptualisation of a development project.

**•Categorised under:**

- Feasibility, Planning, Design,
- Greenfield Development,
- Site Ecology,
- Low Density,
- Developer,

## Introduction

Indigenous flora and fauna needs to be identified when in the initial investigation stages of a development, where the environmental complexity and regional setting of a proposed development is defined. Decisions on the conservation status of indigenous flora and fauna can then be addressed in an overarching Site Biodiversity Management Plan (SBMP) where, for example, open space (vegetation and habitat mapping), riparian corridors, identified threatened species and weed management, if applicable, are interfaced with the economic imperatives of development. Although sometimes difficult to define accurately, open space needs to be conserved in such a way as to protect functional corridors where animals can move safely, thus facilitating population dynamics.

The subsequent stages in planning for conservation of indigenous flora and fauna involves a dynamic situation where economic imperatives, engineering methodologies, legislative constraints, and other extraneous influences such as visual amenity/landscape themes are juxtapositioned to achieve the optimal built environment configuration with consideration of conservation of existing biodiversity elements, and recognising that various levels of impact from Anthropogenic Perturbation already may be in evidence. If the biodiversity of a site is sufficiently complex and therefore of high conservation value, and this indigenous flora and fauna so defined (and which underpins the site level of biodiversity) cannot be conserved, then the development of the site needs to be considered more closely, including the 'no development' option.

The fundamental position of sustainable development needs to embrace an approach where the site ecology existing ie. indigenous flora and fauna, is not obliterated by the proposed development, rather conserved to provide functional habitat complexity. In small allotment developments ie,  $\pm 500\text{m}^2$ , this can be achieved by conservation of remnant vegetation in gully lines, parklands where there is some dedication to conservation of indigenous species in lines or clumps, and within the easements set aside for main arterial roadways, remembering that roadways can veer around significant trees on connector roads within estates. The net effect is that a vestry of landform and associated vegetation can remain, even if the development is typically a 'slab on ground' in tiered building platform design, fully cleared and optimising land yield. The estate should retain the character of the original site ecology in some part and conserve tall trees in open space areas to reinforce this pre-development condition as a 'signature' vertical element. Regional significance of a site and its connectivity are of fundamental importance in this development scenario.

In larger allotment developments ie.  $> 2000\text{m}^2$ , there is the opportunity to design allotment layout so as to maximise distances between Building Location Envelopes (BLEs), thus providing conservation areas contiguous over boundaries. Areas outside of BLEs, and including Waste Water Disposal Areas (WWDAs) in unsewered developments, can then be conserved under a site covenant thereby ensuring that proportionately large continuous tracts of vegetation can be conserved across estates. Such tracts of conserved and possibly remnant vegetation, if dedicated with consideration of landform/gullies/waterways can become important and functional corridors (Case Study 'Nathanvale Estate') across estates linking with areas off-site. The mature development will have a matrix of BLEs, roadways and conservation areas (Private and Public Open Space), which when planned with consideration of animal movement pertinent to the fauna utilising the site on a neighbourhood to regional basis, will provide Functional Corridors which will support and enhance biodiversity.

In general, biodiversity for an estate with this configuration can be maintained with its essential habitat elements, but there are other important management considerations including restraining of domestic pets, noise and lighting. In estates with this configuration, and augmented with appropriate 'Streetscape' and suggested plantings within allotments, it is a consequence that the built environment does not dominate the character of the estate (Case Study 'Teviot Downs').

## Corridors

The conservation of linear landscapes, either joining large block habitats, or unconnected to other significant habitats can be summarised thus:

- There is no clear set of generalist design parameters to ensure the success of a corridor.
- The success of corridors in conservation, and thereby maintenance of populations, is not well established as only species specific studies review their effectiveness.
- Corridors are only one conservation initiative which should not be viewed as a clearly visible linear landscape, but should be reviewed in the overall site habitat ie. matrix.
- Corridors should not be considered as a conservation measure in themselves.
- Corridors are compromised if mortality rates are increased by, for example, leading to hostile areas of matrix.
- Corridor effectiveness is determined by several factors including length, linkages to large block habitat, and topography/weed infestations modifying velocity of fauna migration.
- Riparian corridors should be considered as separate landscape units with regard to conservation management.

These issues are however most relevant to the pre-development situation, and comment must be made that at the point of development of the property with dwellings as suggested in master-planning layouts, edge effects for corridors will assume a higher importance (noise and light will need to be contained to BLEs) and not extend into corridors thereby reducing their width, and consequently their functionality.

## Riparian corridor

Riparian corridors are stream side areas which support a wealth of biological diversity and are ecologically important regardless of their role as corridors (Rosenberg, 1997). Riparian zones are an unusually diverse mosaic of landforms, communities, and environments within the larger landscape (Naiman, 1997).

Whereas there is evidence that corridors may facilitate movements of individuals within habitats, it is difficult to separate this function from that of simply adding habitat (Rosenberg, 1997). However, riparian corridors are usually remnant habitat that support aquatic and stream verge communities, and owing to this should be considered quite different from linear landscape elements connecting habitat.

## Connectivity (functional corridors)

The potential success of a corridor for a broad number of species is directly related to the habitat quality of adjoining blocks, corridor length, and the speed at which animals can safely move along it ie connectivity. This now needs to be considered with a review of the corridors themselves as proposed on a property pre-construction and referring to, for example, the increased mortality rate anticipated should a corridor lead to a hostile area in a matrix and consequently promoting local extinction.

For this purpose, corridors (in gullies with either regrowth or where remnant vegetation exists) need to be grouped with their boundary association with assessment of contiguous/continuous habitat offsite. The assessment of corridors in this fashion does not include the central riparian corridor for the reasons given above.

Assessment is based on:

- The functionality of the corridor as based on the physical complexity of the vegetation within the corridor. This relates directly to edge effects and in increasing survival rates through, for example, reduced predation pressure. This is a generalist approach which is not a species-specific interrelationship. It focuses on the success of movement for an array of species. A principal factor in this assessment is that the corridor does not lead to what is considered to be a hostile area of the matrix eg. break in the corridor or physical boundary.
- Species-specific interrelationship examining the habitat needs within the corridor, thereby acting in some part as habitat, and the reward for migration in the corridor to adjoining blocks which will have ecological attributes considered pivotal in their life history strategies, and ensure the maintenance of their population on a local to neighbourhood, and perhaps regional scale (local “ within the associated catchments; neighbourhood “ including contiguous catchments; regional “ further a field than the contiguous catchments, but restricted to similar habitat eg. elevation).

The success of corridors is therefore elusive owing to the species-specific nature of the problem. This means that the success of a corridor only makes sense in terms of a particular focal species and landscape eg. Owls “ Thomas (1990); Mammals “ Bennett (1990(a)) & Sharon (1997); Birds “ Catterall (1997). However, one body of evidence supporting the functionality of corridors has emerged. If the vegetation itself is investigated for plant-animal interaction by measuring rates of pollination and seed dispersal, it is evident that corridors increase the exchange of animals between patches (Tewksbury et al, 2002), but the animals involved are not determined. The problem at hand in practical terms is therefore, with the known species recorded on a parcel of land, will a corridor effect movement between habitats for these species, both on and off-site?

Discussion of corridors alone as clearly visible, linear landscape elements embedded in a hostile environment connecting two or more larger blocks of habitat is an oversimplification. Common use definitions of corridors share, implicitly or explicitly, an underlying assumption that corridors have a clearly visible spatial attribute and assume that, in their absence, movement across the associated matrix is primarily random or at least not directed (Peñner et al, 2005). Animals respond to various sources of habitat heterogeneity, being attracted to some while avoiding others (Peñner et al, 2005). This implies that topography is a source of landscape heterogeneity that is widely known to affect animal movement during dispersal eg. gullies. Furthermore, these topographic features may modify movement significantly. Dispersal success is a function not simply of distance, but also of velocity, a factor that is almost entirely ignored in the discussions of the potential of linear patches to serve as corridors (Rosenberg, 1997).

Simply this means that from the outset of considering corridors as a conservation strategy, it must be emphasized that all species have differing requirements from any corridor. And, if this simplest model for corridors cannot demonstrate corridor utilization benefits either generally or species-specifically, then this negates the need for further complex ecological assessment.

## Open space

It is the interplay between the proposed built environment, the existing natural environment, consideration of the history of the site, identification of targeted rehabilitation programmes, and minimal disturbance to drainage lines and riparian zones, which affords environmental planning opportunities which best manage the whole-of-estate environs over the life of the project. Open space designation therefore can be both public and private open space where conservation of vegetation communities and their associated habitats are protected in agreed covenants, which are legally binding on the land for the life of the estate.

In the definitions for corridors, their functionality, and relevance of riparian corridors, it is established in various studies that the most important aspect of corridor planning is the species-specific interrelationship, and proposed linkages between blocks of existing habitat. Put simply, there are three principles which need to be addressed with regard specifically to the pre-development property:

- What species are of “significant value”™ either on, exploiting opportunistically, or foraging into, the proposed development site?  
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- If corridors are proposed as linear landscapes facilitating fauna movement across the estate, then -
  - What are the corridor linkages onsite and offsite?

- What are the corridor expected chances of success ie. survival/mortality rates?
- Are corridors of sufficient area and quality of habitat to be just considered as additional habitat?
- What opportunities are there to embed corridors in a functional matrix resultant from rehabilitation of the landscape outside of the BLEs?
- How do the corridors proposed, including the riparian corridor, relate to the underlying models of theoretical ecology? ie. island biogeography and meta-population models.

It is the planning of open space, both public and private which captures the best outcomes for habitat matrix integration with the built environment. Owing to this broad scale whole of estate, and regional setting, it is a consequence that not only "significant" species are conserved but also biodiversity levels existing are, in some part, conserved.

The simplest model of fauna management for a site, in a non-riparian corridor, is therefore that species existing onsite do so as their life history strategies are supported by the habitat existing within site. It follows therefore that if minimal disturbance is made to the existing landscape ecology during construction, then it is reasonable to expect the persistence of species so determined in the pre-construction fauna survey, if the staging of the construction is sensitive to the indigenous fauna's life histories. It also follows that if the built environment is designed so that the public and perhaps some of the private open space are allowed to regenerate, for example, surrounding an existing system of gullies and riparian corridors in a habitat matrix, that species existing on site will be conserved and that they will opportunistically exploit more extensive and complex habitats afforded by this regeneration.

For more in the Design for Open Space factsheet.

## Key Issues

### Risks

An inherent risk in conserving Australian bushland is the provision of a managed fire regime, essential to support the life history strategies of the Eucalypts, for example. If fire is excluded then native forests will not regenerate, and if fire is too frequent then this can aid in the establishment of weeds.

One solution to this has been to involve the local rural fire brigades, with a fire management plan supplied to the council at the time of lodging for a development approval. Council then administers the fire management plan in concert with the local rural fire brigade(s), and planned firing can then become part of the regional fire management plan, even becoming part of the training schedule.

### Savings

The most obvious savings are environmental where by the conservation of functional corridors ensuring connectivity with surrounding areas, the essential elements of the indigenous flora and fauna are retained ie. facilitation of fauna movement across the estate and aiding in provision of niche breadth ie. complexity of

habitats so afforded.

## **Barriers**

Council itself can become a barrier as they are reluctant, in some cases, to commit to maintenance of large tracts of public open space. This situation has been largely overcome by setting aside conservation areas as self regenerating vegetation communities, buffered with indigenous species planting on road verges contiguous with these conservation areas, which after an initial maintenance period also will become self regenerating.

Streetscape also has to be planned so as to not become a significant impost to Council's mowing and maintenance activities.

Home-owners have to be given a fire management plan for their allotment at the time of purchase, and are then required to take responsibility for their own fire hygiene. However this is not considered to be a significant issue as most purchasers in estates like this accept fire management as a consequence of this lifestyle.

## **Benchmarks**

The maintenance and ongoing support to biodiversity levels are the hallmarks of this development style. Consideration should be given to the quality of lifestyle afforded by this rural setting, where, for example, the sounds of the bush dominate the sensory experience by residents, along with the rural visual amenity afforded by the bush background to the built environment. Children can find natural recreation in discovering rock pools and creek lines along the functional corridors, while as they grow, they can then take advantage of the sporting opportunities at the nearby public grounds and facilities in their neighbourhood.

The benchmark of this estate is the range of habitat afforded by the whole of estate planning with a blend of Parkland residential clustered in the valley where most previous impacts from grazing are evident (Refer figure Nv 2), and leading to large allotments with dedicated BLEs and WWDAs with large private open space allocations with conservation covenants. Coupled with the rehabilitation of the riparian corridor acting as a functional central axis for fauna movement into and across the estate supports the expected conservation outcomes that high biodiversity will be resultant in the mature development, while supporting regionally significant species, and conserving those dependent on the riparian corridor.

The final outcome is a matrix of corridors and fauna friendly habitat through which native fauna can safely move in conjunction with BLEs where light and noise are managed thoughtfully, and domestic pets are constrained.

## **Development phase actions**

### **Feasibility**

All conservation initiatives in response to a site's indigenous flora and fauna are included in the reporting phase of site investigations where mapping of vegetation communities and associated habitats are fully described before consideration of, for example, roadways and allotment configuration.

## Planning

The planning stage is initiated by recognition and discussion within an interdisciplinary team of what the essential elements of the indigenous flora and fauna are, their conservation value, and how their retention can best support a rural theme in parkland residential estate planning.

### Links

- [Nathanvale case study](#)
- [Aurora case study](#)

### References

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