City of Melville

REVEGETATION MANAGEMENT GUIDELINES

CITY OF MELVILLE

May 2012

Disclaimer

Natural Area Consulting (NAC) have prepared this report for the sole use of the Client and for the purposes as stated in the agreement between the Client and NAC under which this work was completed. This report may not be relied upon by any other party without the express written agreement of NAC.

NAC has exercised due and customary care in the preparation of this document and has not, unless specifically stated, independently verified information provided by others. No other warranty, express or implied is made in relation to the contents of this report. Therefore, NAC assumes no liability for any loss resulting from errors, omission or misrepresentations made by others. This document has been made at the request of the Client. The use of this document by unauthorised third parties without written permission from NAC shall be at their own risk, and we accept no duty of care to any such third party.

Any recommendations, opinions or findings stated in this report are based on circumstances and facts as they existed at the time NAC performed the work. Any changes in such circumstances and facts upon which this document is based may adversely affect any recommendations, opinions or findings contained in this document.

Document Control			
Document: Revegetation Management **File:** City of Melville			
Version Date	**Prepared by**	**Reviewed by**	**Approved by**
Draft 1	Sue Brand (NAC)	Luke Summers (NAC) Blair Bloomfield (CoM) Kellie Motteram (CoM) Deanne Wynn (CoM)	Luke Summers (NAC)
Draft 2	Sue Brand (NAC) Alex Devine (NAC)	Sue Brand (NAC) Luke Summers (NAC)	Luke Summers (NAC)

Photographs
All photographs © Natural Area Consulting, except pictures 1, 2, 3 and 8 on the front cover, which are © City of Melville

Table of Contents

1.0 Executive Summary

This guideline was prepared to accompany the Natural Areas Asset Management Plan (NAAMP) and provide a reference document detailing guidelines for the management of revegetation programs and activities at all natural areas within the City of Melville. Revegetation often involves initiating or accelerating recovery of bushland areas to create a diverse, self-sustaining ecosystem with the resilience to recover from natural disturbance events.

The City's approach to revegetation revolves around:

1. focussing on improving those areas that are in good or better condition and which will require minimal restoration effort where possible such that they are maintained in the longer term, and
2. Improving areas of poorer condition in accordance with priorities described in the NAAMP.

There are three broad revegetation techniques that are commonly used, either singly or in combination. These methods are:

- direct seeding,
- planting of tubestock, and
- natural regeneration.

Revegetation of natural areas results in a number of benefits, including:

- improved species diversity,
- increased number of habitats and niches that can be occupied by different fauna species,
- the potential to increase underrepresented vegetation types,
- improved connectivity with other ecological systems,
- resilience and the ability of the ecosystem to respond to events such as storms and fire,
- increased potential for carbon sequestration in plant materials,
- cooler temperatures around the bushland areas, and
- contribution to human uses such as passive recreation.

In recognising the values associated with revegetation outcomes, there are also a number of processes that have the potential to reduce or impact negatively on those outcomes. These include:

- weed invasion,
- uncontrolled access,
- the presence of feral and pest animals,
- frequent, destructive fires, and
- dieback and disease.

An assessment template has been prepared that allows consideration of the need for revegetation along with the presence of and impacts associated with threatening processes on planned activities (Appendix 3).

2.0 Acronyms and Abbreviations

CALM	Conservation and Land Management
CBD	Central business district
CoM	City of Melville
DEC	Department of Environment and Conservation
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)
ha	hectare
km	kilometre
m	metre
NAAMP	Natural Areas Asset Management Strategy
NAC	Natural Area Consulting

3.0 Introduction

The City of Melville is a local government area of 52km² located 8km south of the Perth CBD. It contains a number of significant biodiversity assets that are under threat. Revegetation of bushland areas has been identified as one means of restoring flora and fauna biodiversity in the Natural Areas Asset Management Plan (NAAMP) (City of Melville 2011). The objective of this guideline is to provide key information regarding revegetation processes to direct on ground revegetation activities within the City of Melville at its:

- Bush Forever reserves,
- ecological community sites,
- wetland sites,
- heritage sites, and
- community interest sites.

Revegetation can be described as the process of restoring bushland areas to allow the regeneration of a typical bushland structure that might have existed prior to disturbance. It is recognised that restoration of bushland areas will contribute to biodiversity restoration, as habitats and food sources suited to native animals become established.

Revegetation principles and/or steps include:

- having clearly defined aims and objectives – e.g.: restoration of natural area, biodiversity enhancement, aesthetic values, and similar
- determine a suitable species list for the nominated site, considering soil type, planting zone within the landscape, along with restoration of a suitable vegetative structure (over, middle and understorey),
- determine most appropriate method for revegetation,
- consider threats to revegetation success, such as the presence of weeds, rabbits, and similar and how they may need to be controlled,
- consider costs and timeframes required to achieve restoration outcomes,
- develop and implement an appropriate revegetation plan for the site, and
- develop appropriate completion criteria and monitor outcomes to determine whether or not they have been achieved..

4.0 Approaches to Revegetation

As with many environmental issues today, prevention is easier and more cost effective than having to implement recovery programs, and the same principle can be applied to revegetation. Preventing deterioration in bushland areas of good condition will be easier and more cost effective in the longer term than allowing degradation to continue. It should be noted that restoration is a process that aims to increase natural succession towards a mature, stable community with a high level of diversity. Accordingly, this process may take 20 or more years to achieve, and nesting hollows and other features of a mature ecosystem will not occur in the short term. The aim of maintaining bushland areas in good or better condition is reflected in the NAAMP with the rating of reserves according to overall condition. While the overall aim is to maintain bushland reserves in good condition, disturbances still occur that require some form of revegetation to restore an area to a good or better condition, along with its ecological values.

There are three main approaches to revegetation, namely:

- direct seeding,
- tubestock planting, and
- natural regeneration.

Each of these approaches has a range of advantages and disadvantages, making them better suited to some situations, and which will need to be considered when deciding on the most appropriate method(s) for a nominated area.

Irrespective of the approach adopted, there are a number of general principles that will assist with maximising the success of revegetation activities, including:

- understanding site characteristics,
- working outward from areas of good vegetation to those areas in poor condition,
- treating any weeds present at an appropriate stage of their development and prior to replanting activities, recognising that follow-up weed treatments may be required,
- if required, undertaking other ground preparation activities, such as the treating compacted areas,
- using appropriate species to restore a natural vegetation structure that will provide or restore a range of habitats and ecological niches that can be occupied by native fauna species, with details being included within the NAAMP
- considering the need to control the presence of invasive species (e.g.: rabbits) or other threatening processes (e.g.: erosion) that might otherwise impact on seedlings becoming established in the longer term,
- determining success criteria and monitor over time to evaluate whether success criteria have been achieved,
- where possible, sourcing seed of local provenance to ensure species are adapted to local environmental conditions and to preserve the local genetic diversity,
- recognition of the needs for post revegetation maintenance, and
- best practice would include attempts to replant ‘difficult’ to grow/propagate species

4.1 Direct Seeding

Direct seeding uses seed of appropriate species that are sown mechanically or by hand within the area to be revegetated at a rate of between 2 - 4 kg/ha, depending on site conditions and target species. It is a useful method of restoring a diverse range of species in a nominated area with healthy plants, as well as being a good means of supplementing the planting of tubestock and/or natural regeneration. Considerations and recommendations for direct seeding include the following:

- where possible, use of local provenance seed that is adapted to local conditions, including local climatic conditions,
- requires a longer establishment period,
- monitoring of results should be undertaken over many years as seed will have differing dormancy periods,
- uses more seed than will actually germinate, as seed viability is difficult to ensure,
- can include species that cannot be grown in a nursery,
- many local native plant seeds require one or more treatment methods to break seed dormancy and to maximise the likelihood of germination and healthy growth,
- predation by insects, particularly ants, and birds is common,
- weeds treatment prior to revegetation activities is recommended, and may need to be undertaken during establishment,
- likely to result in a bushland structure typical of the area,
- while some seed can be expensive to purchase, establishment costs are lower than planting of tubestock, and
- weed control needs to be undertaken with extreme care on direct seeding sites by very experienced operators so that new germinates are not treated with herbicide due to misidentification.

4.1.1 Local Provenance Seed

Collection of local provenance seeds is preferred for revegetation projects within the City. 'Local provenance' relates to seeds that are sourced from species currently growing in a particular area, and thus are best suited to the soil type, climate, and other growing conditions present. Seed collected from the same target species from other locations may have developed adaptations suited to its source area, and may not germinate or flourish in differing conditions.

4.1.2 Seed Collection

The collection of seed needs to be carried out by appropriately experienced and licensed personnel at a suitable time of year for the target species. Seed collection considerations include:

- areas where collection can occur – e.g.: within nominated reserves, foreshore, or similar,
- accessibility of sites,
- collection from identified target species,
- seed collection tools need to be cleaned before use,
- seeds should be collected from:
  - mature plants, with no more than 20% being taken from a particular plant,
  - taken from the 30% of the crown and all sides of the plant,
  - at least ten (10) plants of the same species,
  - in equal quantities from each plant,
  - with plants with a good fall distance between each plant,
  - from plants which are true to form rather than hybridised varieties, and
  - from plants that are not isolated or only occur in remnant lines along fence lines or verges,
- licenses/permits applied for and received,
- seed returns completed when due

4.1.3 Mechanical Seeding

Mechanical seeding involves the use of machinery to disperse seed from the back of a vehicle; the seed is typically mixed with clean sand to aid in dispersal. This method of seeding has the advantage of broadcasting considerable volumes of seed over a large area with minimal physical effort. The main disadvantage of this method is that it often requires vehicle access, is not suited to large areas and requires large volumes of seed. In addition, there is less control of the depth of

seed burial. Mechanical seeding is best suited to large scale restoration projects where a large surface area requires seeding. Accordingly, this method is unlikely to be used within the City of Melville.

This method of seeding is not suitable for all species due to the potential for damage. Examples include large seeds, such as those of the Zamia Palm (*Macrozamia riedlei* and *M. Fraseri*), and the Woody Pear (*Xylomelum occidentalis*), or large, papery seeds from some Banksia and Hakea species.

4.1.4 Hand Seeding

Hand seeding involves physically walking the area to be seeded with a container or kidney bucket, which has ergonomic advantages, and dispersing the seed mixed with sand. This method is ideal for large and/or 'papery' seeds that can be damaged in mechanical seeders, application in smaller areas and where vehicle access is not available. The advantage of this method is the greater control over where the seed is broadcast and the lower investment in equipment.

A disadvantage of this method is the weight involved with the seed mix to be spread by hand in terms of manual handling and ergonomics from an occupational health and safety perspective. The use of some form of strap on the shoulder(s) attached to the container is recommended, as is the use of a kidney-shaped bucket and limiting the weight of the seed mix to be spread at any one time is the best way to manage the risk of strain or injury (Figure 1).

Figure 1: Seeding Bucket with Waist and Shoulder Straps

4.1.5 Seed Processing and Storage

After collection, seeds need to be processed to avoid rotting, the proliferation of mould and fungi, or the inclusion of insects in seed batches. Processing will include:

- drying away from wind and animals,
- extraction of the seed from the casing (e.g.: capsule, pod, cone), using a range of methods according to the seed type, such as:
  - air separation,
  - threshing,
  - soaking and de-pulping,
  - hand sorting,
- storage in a suitable facility that is temperature (room temperature as a minimum) and humidity controlled (less than 50%), secure and protected from light, dust, insects and animals,
- seed is stored in air tight plastic containers, labelled, and details recorded in an appropriate database (date and place of collection, collector).

4.2 Tubestock Planting

Tubestock planting involves the growing of selected species in forestry tubes from seed, cuttings, or the division of parent stock. Tubestock are raised in a nursery until they reach an optimum size for planting, and then transported to the location where they are to be planted. Considerations for tubestock planting as a revegetation technique include:

- provides an outcome visible to the general public,
- can be costly due to labour involved with seedling production and planting,
- range of species available is often less than would occur naturally within a given location, but are unavailable for a variety of reasons, including difficulties in sourcing viable seed and propagating tubestock in a nursery environment.
- if not planned effectively, installation of plants can result in unnatural looking vegetation stands because they are planted in clumps of the same species, in uniform rows, or similar, and
- outcomes are more reliable, with survival rates of 75% or more achievable when planting is done in conjunction with weed control and other revegetation principles

Tubestock planting is preferable over direct seeding method where environmental conditions may constrain natural germination of seed, such as in degraded areas, where there is a higher potential for weed invasion, and where an outcome is required in the short term rather than a longer timeframe.

Tubestock should be sourced from reputable suppliers, such as Nursery Industry Accreditation Scheme, Australia (NIASA) and/or Nursery and Garden Industry Association (NGIA) accredited suppliers, and using species grown from local provenance seed where possible. Planting should occur during cooler months after the first winter rains to encourage establishment in a short time frame. The use of tree guards and fertilising at the time of planting will increase survival and promote growth.

4.2.1 Planting Density

When tubestock planting is the preferred method of revegetation, it is necessary to determine a suitable planting density and ratio of over storey, middle storey and understorey species whilst also avoiding over representation by coloniser species. While the accepted planting density is one plant per square metre (1 plant per m^2) for dryland species, there are a number of factors that need to be taken into consideration, including:

- the current density of vegetation at the site, as the overall aim is to achieve 1 plant per m^2, including any plants already present at the site,

- the ratio of trees (over storey) to shrubs (middle storey) and herbs and grasses (understorey); as a generalisation, over storey species can be planted at densities of 1 plant per 10 to 20 m^2, according to canopy cover and vegetation type, while middle storey species (shrubs) can be planted at densities of 1 plant per 5 to 10 m^2; actual planting densities will be determined in accordance with desired revegetation aims and area to be planted.

The accepted planting density for wetland plants such as sedges and rushes is usually six plants per m^2 (6 plants per m^2). Larger water tolerant plants such as *Melaleuca rhaphiophylla* and *Eucalyptus rudis* would be planted at a similar density as dryland species.

4.3 Natural Regeneration

Natural regeneration as a revegetation technique relies on the germination of native plant seeds that have been dispersed from the parent plants into the topsoil or the tree canopy, waiting until conditions are appropriate for establishment and growth. This form of revegetation often requires a long lead time for results to become apparent, but is a useful approach when applied in combination with tubestock planting or direct seeding. This method is the overall goal of revegetation, with seeding and planting used to facilitate and accelerate the process of returning an area to a self sustaining ecosystem. Considerations associated with natural regeneration as a revegetation technique include:

- likely to result in a greater species diversity and more natural vegetation structure (under, middle and upper storey),
- plants are particularly suited to the on-site growing conditions, and thus likely to be healthier and more resistant to disturbances in the longer term,
- works best in proximity to a vegetation stand in good condition, as this will supplement seed supplies in the area to be revegetated,
- ongoing weed treatment or management of other threatening processes (e.g.: predation by rabbits) may be required, and
- access management, such as fencing, to protect plants from damage during the establishment period.

5.0 Revegetation Considerations

Once the nominated approach to revegetation has been decided, there are a number of considerations that need to be taken into account with the aim of maximising outcomes. These can be evaluated during targeted site assessments, and formalised in a revegetation management plan.

5.1 Site Assessment

Before commencing revegetation activities, it is necessary to undertake a suitably comprehensive site assessment that will assist with determining the level and type of revegetation activities that will need to take place, and the various threatening process that will need to be managed. Typical assessment activities may include:

- vegetation type and condition surveys,
- identification of floristic species present,
- the presence of any rare or endangered flora and fauna species, along with threatened or priority ecological communities listed at a State and Commonwealth level,
- weed presence and mapping,
- if required, consideration of *Phytophthora* dieback,
- identification of other threatening processes, such as the presence of feral animals, erosion, or uncontrolled access,
- determining areas (m^2, ha) where revegetation works are recommended, and
- recommending planting density, along with target species composition and diversity based on current site conditions.

It is recognised that the NAAMP has documented key information such as soils, climate and broad vegetation information across the City boundaries. The City also has other records available that will assist with the site assessment, such as information from the Department of Environment and Conservation (DEC) regarding the presence of rare or endangered flora, fauna and ecological communities. Ground-truthing of Information should be undertaken during on-site assessment activities.

Outcomes of the assessment will enable suitable revegetation plans to be prepared that detail the:

- revegetation aims and objectives,
- area (m^2, ha, other) where revegetation needs to occur,
- revegetation techniques to be used,
- management of any threatening processes that will need to occur prior to and/or post planting,
- planting density,
- watering requirements (if any),
- success criteria along with monitoring and reporting requirements.

5.2 Threatening Processes

Revegetation usually occurs after some event or process results in degradation, such as weed invasion, the presence of pest or feral animal species, frequent fires, storm events, or similar. The presence of such threats needs to be considered and managed to maximise the likelihood of a successful revegetation outcome. Some discussion of key threatening processes is provided, recognising that the information is expanded on in the relevant guideline documents associated with the NAAMP.

5.2.1 Weeds

A weed is a plant species that is found outside of its usual range, and often in the absence of diseases and/or predators that would normally keep populations in check. Weeds often have one or more characteristics that enable them to out-compete native plant species for resources such as light, water space, and nutrients. The presence of weeds in bushland and other areas has been identified in the NAAMP as being one of the ten most threatening processes to biodiversity within the City. The presence of weeds should be assessed and any controls implemented in accordance with the NAAMP Weed Guideline prior to undertaking revegetation works.

5.2.2 Feral Animals

Feral animals pose a threat to the presence of native animal species that would occur naturally in bushland areas, and have also been identified in the NAAMP as being one of the ten most threatening processes to biodiversity in the City. Feral animals are also known to pose a risk to revegetation activities through predation on tubestock and damage to flora and vegetation. The presence of feral animals should be assessed prior to revegetation works, and the NAAMP Feral Animal guideline consulted to determine the most appropriate control method if required.

5.2.3 Access

Access by people, vehicles, and/or pets or other larger animals to bushland areas can result in or decrease the success of planned revegetation works. Access may need to be limited by:

- limiting vehicle movement to authorised areas and tracks only,
- precluding pets from nominated reserves or key locations within a reserve, and
- using some form of fencing to prevent access to areas being rehabilitated, at least until such time as plants become well established (duration will be dependent on the revegetation methodology chosen).

The Sign, Path and Barrier Guideline should be referred to for further information.

5.2.4 Fire

Many Australian plants have developed afire ecology over time, meaning that fire can be an important consideration in revegetation activities as some plants require heat to release seed from their canopy or the presence of smoke to trigger seed germination. However, fire also has the potential to encourage weeds if they occur too frequently or burn at an intensity that kills plants rather than assists with seed release and germination. Fire management in the form of:

- consideration of controlled burn frequency and locations, and
- management response in the event of a fire,

needs to be considered when planning and implementing revegetation activities, as seedlings and both immature and mature plants will not be able to withstand the effects of fire. The Bushfire Strategy should be referred to for further information.

Fire events can be a good opportunity to undertake revegetation activities in conjunction with weed control. If fires do occur, the opportunity to commence revegetation works should be taken.

5.3 Soil/Ground Preparation

Depending on the nature and extent of the degradation, some form of ground preparation may be required. This may include:

- ripping of areas where compaction has occurred, noting that compaction can be at or below the surface,
- restoring areas where erosion has occurred,
- preventing further erosion, and
- undertaking mulching.

5.3.1 Ripping

Ripping involves mechanically breaking up soil that has become compacted, thus restricting plant growth and affecting the movement of water and nutrients. There are two types of compaction; cultivation and traffic. A cultivation hardpan is formed by moist clay soils breaking down over time and is typically located bellow the soil surface. A traffic hardpan is associated with sands and sandy loams and forms in response to vehicle traffic. Individual grains of sand interlock and form a hard surface layer preventing root penetration. There are a number of different t types of ripping machinery although the most effective is a multi bladed hydraulic ripper. The maximum ripping depth is 30 cm in soils with a cultivation hardpan and 45 − 50 cm for a traffic hard pan (Mullan and White, 2002).

5.3.2 Erosion Control

Erosion control is required where there is a potential for sediment and productive topsoil to be moved by the action of wind, water and biological agents, such as within foreshore areas. A loss of productive soil has the potential to damage restoration by removing nutrients and beneficial soil biota. Types of erosion likely to affect revegetation activities are identified in Table 1.

Table 1: Erosion Types, Effects and Treatment

Erosion Type	Characteristics	Treatment
Bank Erosion	• associated with waterways • may result from tidal action, boat wash or wave action	• brush mattressing • rock toe protection • biodegradable geo-textile matting
Gully Erosion	• forms when high velocity water removes sediment along drainage lines forming deep a deep rut	• install contoured drainage lines • install rocks to disperse flow of water
Sheet Erosion	• occurs on slopes • loss of sediment and topsoil	• break up the movement of water with physical barriers such as geo-textiles or logs
Wind Erosion	• moves small soil particles	• biodegradable geo-textile matting • sand trap fencing • wind protection fencing

5.3.3 Mulching

In order to maintain revegetation sites and keep them separate from grassed areas it may be necessary to install a layer of mulch. Mulching is beneficial in reducing water loss from the soil, suppressing weed growth and providing nutrients once the media begins to breakdown. Installation before or after planting will need to be assessed on a case by case basis. Material should be sourced from reputable suppliers or clean green waste as not to introduce weeds or plant pathogens.

5.4 Watering

In previous years, tubestock were planted during winter months, usually after the first winter rains that typically occurred in May, with no further attention. As the Western Australian climate dries, less rainfall in winter can impact negatively on a seedling's ability to become established and thrive, particularly during very hot times during summer. Accordingly, watering may be required during the first summer at a rate of 2L per plant on a monthly or more frequent basis if conditions are particularly warm/hot and dry. This requirement will need to be assessed according to conditions that occur during and after the initial planting.

5.5 Success Criteria and Monitoring

As the establishment of native plants takes time, and not all seeds will germinate and not all tubestock will survive the initial planting season, it is essential that success criteria is established and monitoring of those criteria over time are developed. These goals are typically measured against a 2-3 year timeframe, although longer term monitoring allows for a comprehensive insight into revegetation success. Monitoring goals should be established that take into account current site attributes such as weed coverage, native species diversity and plant survivability. In this way, it can be determined if infill planting or some other means of enhancing outcomes needs to be implemented or when the location can be considered self-sustaining and requiring less active management.

Success criteria should be measured against a time frame so that it can be monitored, and can include:

- survival and establishment of a nominated percentage of tubestock planted (e.g.: 70% or greater),
- presence of weeds being less than a nominated percentage of area planted, (e.g.: 5 – 10%, reducing over time),
- restoration of a natural vegetation structure, including under, middle and over storey species, and
- achievement of a nominated species diversity within an area (e.g.: percentage of species that are considered to be local natives).

Monitoring activities typically occur for a minimum of two or three years after planting during autumn and spring. Outcomes are usually documented in a report that will be provided to the City's Environmental Coordinator. Typical monitoring activities can include any or all of the following:

- recording the numbers and species of tubestock planted, along with location,
- assessing whether individual plants are in good health, poor health, or have not survived,
- setting up quadrats within the revegetation zones to undertake detailed assessments,
- setting up transects or relevés within the revegetation zones as an alternative to quadrats, and
- setting up a series of photo monitoring points at nominated locations that can be used to record revegetation over time.

5.6 Climate Change and Revegetation

It has been identified under current climate change models that the south-west region of Western Australia will experience a more arid climate with increasingly erratic rainfall and more intense storm events. While this may impact on species present at a particular location over time, Plants should be selected that are of local provenance ensuring they are adapted to local site conditions and selective pressures. It may be necessary to plant species that will fare better under increasing water stress where it has been identified that the current vegetation type is in decline, such as a drying wetland. It may be necessary to alter planting techniques to include the provision of more water in particularly long periods of drought.

5.7 Revegetation Site Assessment

In order to assist with determining whether or not a particular area needs to be revegetated, a site assessment template has been developed, and is provided in Appendix 3.

6.0 Conclusion

Revegetation is a key management activity that can improve and restore natural areas after disturbances such as fire, weed invasion or clearing. In order to maximise success rates, revegetation needs to be planned after undertaking an assessment of the target area to ensure threatening process are effectively managed. As with many environmental issues, prevention of degradation is more cost and resource effective than undertaking restoration activities. As highlighted in the NAAMP, management and maintenance of bushland areas with a rating of 1 will be given priority for revegetation activities. Given that the City cannot control degradational processes that occur outside reserve boundaries, such as the spread of weed seeds by birds, there is likely to be an ongoing need for revegetation in the longer term.

It is also recognised that revegetation activities may include assessment of key threatening processes, thus it will be necessary to refer to relevant strategies or guidelines associated with the broader NAAMP document, such as:

- weed control strategy and guidelines,
- feral animal strategy and guidelines,
- sign, path and barrier guidelines, and
- bushfire strategy.

7.0 References

City of Melville, (2011), *Natural Areas Asset Management Plan*, City of Melville, Western Australia.

DEC (undated) *Seed Notes*, available World Wide Web URL: www.dec.wa.gov.au/component/option,com_docman/task.../Itemid,711/, accessed May 2012

Florabank, http://www.florabank.org.au/default.asp?V_DOC_ID=755, accessed May 2012

DEC (Undated) Wildlife Notes 4: http://www.dec.wa.gov.au/component/option,com_docman/task,cat_view/gid,325/Itemid,99999999/

Lamond, S., (2009), Local Government Guidelines for Bushland Management in the Perth and Coastal South-West Natural Resource Management (NRM) Regions Western Australia, available World Wide Web URL: http://pbp.walga.asn.au/Publications/LocalGovernmentGuidelinesforBushlandManagement.aspx, accessed May 2012.

Mullan and White, (2002), Revegetation Site-Preparation in the WA Wheatbelt – Ripping and Mound Ploughing, Bushcare and the Department of Conservation and Land Management, Western Australia, World Wide Web URL:

Strategic Environmental Alliance, (2010), Bush Regeneration and Weed Control, available World Wide Web URL http://www.hotfrog.com.au/Companies/Strategic-Environmental-Alliance/Bush-regeneration-and-weed-control-142051, accessed March 2012.

Sweedman, L., and Merrit, D., (Eds), (2006), *Australian Seeds: A Guide to Their Collection, Identification and Biology*, CSIRO, Australia.

Appendix 1- Relevance to Sustainability

Revegetation is a sustainability issue, as it has the potential to increase species, genetic and ecosystem biodiversity through the restoration of native vegetation in bushland areas. As the area of self-sustaining bushland and reserve areas increases, the number of habitats and niches that can be occupied by native fauna species also increases. Maintaining bushland and the various reserves in good or better condition also means they are more likely to be able to withstand threatening processes that lead to degradation, and thus require less active management and maintenance.

Appendix 2 – Sample Request for Quotation

REQUEST FOR QUOTATION

Request for Quotation (RFQ):	ANNUAL FERAL ANIMAL CONTROL IN THE CITY OF MELVILLE

Deadline:	28 July 2011, 4PM

Address for Delivery:	CITY OF MELVILLE Locked Bag 1 BOORAGOON WA 6954 10 Almondbury Road, BOORAGOON WA 6154

Table of Contents

PRINCIPAL'S REQUEST

Definitions
Below is a summary of some of the important defined terms used in this Request.

Attachments:	The documents you attach as part of your Response;
Contractor:	Means the person or persons, corporation or corporations whose Response is accepted by the Principal, and includes the executors or administrators, successors and assigns of such person or persons, corporation or corporations;
Deadline:	The deadline for lodgement of your Response;
General Conditions of Contract:	Means the General Conditions of Contract nominated in Part 1 and incorporated in a Contract in accordance with clause 1.5.7;
Offer:	Your offer to be selected to supply the Requirements;
Principal:	The City of Melville
Response:	Completed Offer, response to Selection Criteria and Attachments;
Request:	This document;
Requirements:	The work requested by the Principal;
Selection Criteria:	The criteria used by the Principal in evaluating your Response;
Special Conditions:	The additional contractual terms;
Specification:	The statement of Requirements that the Principal requests you to provide if selected.

How to Prepare your Response
Carefully read all parts of this document
Ensure you understand the Requirements (Part 2)
Complete, sign and return the Offer (Part 3) in all respects and include all Attachments
Make sure you have responded to all of the Selection Criteria
Lodge your Response before the Deadline.

Contact Persons
Respondents should not rely on any information provided by any person(s) other than those listed below:

Contractual Enquiries
Name: **Deanne Wynn**
Telephone: **9364 0283**
Mobile: **0421 029 101**
Email: **deanne.wynn@melville.wa.gov.au**

Selection Criteria
The Contract may be awarded to a Respondent(s) who best demonstrates the ability to provide the services under the contract at a competitive price. The quoted prices will be assessed together with the qualitative and compliance criteria to determine the most advantageous outcome to the Principal.

The Principal has adopted a best value for money approach to this Request.

This means that, although price is considered, the Response containing the lowest price will not necessarily be accepted, nor will the offer ranked the highest on the qualitative criteria.

A scoring system will be used as part of the assessment of the qualitative criteria. Unless otherwise stated, a Response that provides all the information requested will be assessed as satisfactory. The extent to which a Respondent demonstrates greater satisfaction of each of these criteria will result in a greater score. The aggregate score of each Response will be used as one of the factors in the final assessment of the qualitative criteria and in the overall assessment of value for money.

Compliance Criteria
These criteria are detailed within Part 3 of this document and will not be point scored. Each Response will be assessed on a Yes/No basis as to whether the criterion is satisfactorily met. An assessment of "No" against any criterion may eliminate the Response from consideration.

Qualitative Criteria
In determining the most advantageous Response, the Evaluation Panel will score each Response against the qualitative criteria as detailed within Part 3 of this document. Each criterion will be weighted to indicate the relative degree of importance that the Principal places on the technical aspects of the goods or services being purchased.

NOTE: It is essential that Respondents address each qualitative criterion.
Information that you provide addressing each qualitative criterion will be point scored by the Evaluation Panel.

Failure to provide the specified information may result in elimination from the evaluation process or a low score.

Price Considerations
Weighted Cost Criteria
The weighted price method is used where price is considered to be crucial to the outcome of the contract. The price is then assessed with quality.

Criteria	Weighting
Quoted price	30%

Price Basis
Fixed Prices

All prices for services offered under this Request are to be fixed for the term of the Contract.
Quoted prices must be exclusive of GST.

Conditions of Responding

Lodgement of Response and Delivery Method
The Response must be lodged by the Deadline. The Deadline for this Request is 28 July 2011.

The Response is to be:
Placed in a sealed envelope clearly endorsed with the Quote number and title as shown on the front cover of this Request; and either hand delivered to:

Deanne Wynn
City of Melville
10 Almondbury Road

Booragoon WA 6154

Or sent through the mail to:

Deanne Wynn
City of Melville
Locked Bag 1
Booragoon WA 6954

Respondents must ensure that they have provided 2 signed copies of their Response (one to be marked “ORIGINAL” and the other(s) to be marked “COPY”.

Electronic mail responses will be accepted however, the Principal does not accept responsibility for transmission failure or responses being received after the closing time and date due to late electronic delivery. Email responses are to be sent to: **deanne.wynn@melville.wa.gov.au**

All pages should be numbered consecutively.

Rejection of Responses
A Response may be rejected without consideration of its merits in the event that:
The Response is not submitted at the time and at the place specified in the Request; or
The Respondent does not submit an Offer form which has been completed and signed together with all the required Attachments; or
The Response fails to comply with any other requirements of the Request.

Late Responses
Responses received after the Deadline will not be accepted for evaluation.

Acceptance of Responses
The Principal is not bound to accept the lowest Response and may reject any or all Responses submitted.

Disclosure of Contract Information and Documents
Documents and other information relevant to the contract may be disclosed when required by law under the *Freedom of Information Act 1992* or under a Court order.

Response Validity Period
All Responses will remain valid and open for acceptance for a minimum period of three (3) months from the Deadline.

General Conditions of Contract
Responses will be deemed to have been made on the basis of and to incorporate the General Conditions of Contract for the Engagement of Consultants.

It is the Applicants responsibility to ensure they have read and understood General Conditions of Contract for Engagement of Consultants AS 4122 – 2000.

Applicants can obtain copies of General Conditions of Contract for the Engagement of Consultants AS 4122 – 2000 from www.saiglobal.com.

PRECEDENCE OF DOCUMENTS

In the event of there being any conflict or inconsistency between the terms and conditions herein and those in the General Conditions of Contract the terms and conditions appearing in this Request will have precedence.

Respondents to Inform Themselves
Respondents will be deemed to have;

(a) Examined the Request and any other information available in writing to Respondents for the purpose of responding

(b) Examined all further information relevant to the risks; contingencies, and other circumstances having an effect on their Response which is obtainable by the making of reasonable enquires

(c) Satisfied themselves as to the correctness and sufficiency of their Responses including quoted prices which will be deemed to cover the cost of complying with all the Conditions of Responding and of all matters and things necessary for the due and proper performance and completion of the work described therein

(d) Acknowledged that the Principal may enter into negotiations with a chosen Respondent and that negotiations are to be carried out in good faith

(e) Satisfied themselves they have a full set of the Request documents and all relevant Attachments.

Alterations
The respondent must not alter or add to the request documents unless required by these conditions of responding.

The principal will issue an addendum to all registered respondents where matters of significance make it necessary to amend the issued request documents before the deadline. Any request for information clarification must be made in writing to the appropriate person nominated at 1.3.

Ownership of Responses
All documents, materials, articles and information submitted by the Respondent as part of or in support of a Response will become upon submission the absolute property of Principal and will not be returned to the Respondent at the conclusion of the Response process PROVIDED that the Respondent is entitled to retain copyright and other intellectual property rights therein, unless otherwise provided by the Contract.

Canvassing of Officers
If a Respondent, whether personally or by an agent, canvasses any of the Principal's Commissioners or Councillors (as the case may be), or Officers with a view to influencing the acceptance of any Respondent made to it or any other Respondent, then regardless of such canvassing having any influence on the acceptance of such Response, the Principal may at its discretion omit the Respondent from consideration.

Identity of the Respondent
The identity of the Respondent and the Contractor is fundamental to the Principal.

The Respondent is the person, persons, corporation or corporations named as the Respondent in Part 3 and whose execution appears on the Offer Form in Part 3 of this Request. Upon acceptance of the Response, the Respondent will become the Contractor.

Alternative responses

All Alternative Responses MUST be accompanied by a conforming Response.

Responses may be submitted as Alternative Responses or made subject to conditions other than the General and Special Conditions of Contract must in all cases arising be clearly marked "ALTERNATIVE RESPONSE".

The Principal may in its absolute discretion reject any such Alternative Response as invalid.

If the Response is marked as an Alternative Response, any printed "General Conditions of Contract" shown on the reverse of a Respondent's letter or quotation form will not be binding on the Principal in the event of a Contract being awarded.

PART TWO

READ AND RETAIN THIS SECTION

SPECIFICATION AND SCOPE OF SERVICES

Background

The City of Melville has undertaken an annual feral control program on foxes, cats and rabbits for the past three years. The majority of the feral animals in these programs have been located in and around Ken Hurst Park, Blackwall Reach/Point Walter Reserve, Piney Lakes Reserve, Blue Gum Lake, Booragoon Lake, Bull Creek Wetlands, Quenda Wetlands, Attadale Foreshore Reserve and Wireless Hill Park although the animals are controlled and treated throughout the City wherever they occur.

Invited Quotations are being sought by the City of Melville ("City") for a suitably qualified and experienced contractor within the field of pest management to undertake a program of feral animal control for the 2011–2012 financial year.

Applicants shall familiarise themselves with the City of Melville Natural Areas Asset Management Plan (NAAMP) and the Australian Pest Animal Strategy developed by the Department of the Environment and Water Resources (now the DSEWPC).

The applicant should be skilled in identification of at-risk native fauna; aware of strategies to minimise risks to native fauna; skilled in the use of traps/trapping; monitoring and be experienced in the bushland environment.

Scope of Services

The NAAMP has identified that the introduced animals that are considered Very High Impact in terms of their effect on biodiversity are:

Very High Impact Introduced Animals

Animal	**Declared Animal** (253 species requiring control or management)	**Key Threatening Process** (19 processes subject to Threat Abatement Plans)	**Vertebrate Pest Animal of National Significance** (11 species)
Feral Cat *Felis catus*	Excluded from declaration.	Predation by Feral Cats	√
European Wild Rabbit *Oryctolagus cuniculus*	Reduce / control (when at large/ running wild)	Competition and land degradation by rabbits	√
Fox *Vulpes vulpes*	Reduce / control	Predation by European Red Fox	√

The contractor is to provide a quote for an annual control program for the following animals that includes, but is not limited to;

Feral Cat:
Surveys of the nominated bushland and foreshore reserves for the presence of feral cats;
Control of feral cats through the use of cage traps;
Humane disposal of captured cats in accordance with the Animal Welfare Act.

European Rabbit:
Surveys of the nominated bushland and foreshore reserves for the presence of feral rabbits;
Fumigation of active rabbit warrens using phosphine tablets or other approved fumigants;
Control of rabbits through the release or rabbit haemorrhagic disease virus (RHDV) and/or myxomatosis at sites where rabbit activity has been detected;

Control of rabbits at Ken Hurst Park using the above methods and/or 1080 baiting;
Humane disposal of captured rabbits in accordance with the Animal Welfare Act

European Fox:
Surveys of the nominated bushland and foreshore reserves for the presence of feral foxes;
Trapping of foxes through the use of cage traps;
Trapping of foxes through the use of soft foot-hold traps;
Fumigation of dens at appropriate times during the breeding season using carbon monoxide cartridges or other approved fumigants;
Humane disposal of captured foxes in accordance with the Animal Welfare Act.

Other:
Close liaison and communication with City of Melville staff;
Responding to/reporting of notifications by the public of introduced fauna sightings;
Feral animals observed in reserves or locations other than those mentioned previously should also be treated;
Use of control methods other than those mentioned may be investigated if required;
Submission of a final report to the City of Melville outlining observations made, control methods utilised, success rates of control methods, ie, approximate kill rates, the number and GPS location of dens and warrens treated and the number of warrens or dens revisited and requiring re-treatment.

All trapping and disposal must be undertaken in accordance with the requirements of the *Animal Welfare Act 2002* and in line with the Standard Operating Procedures and Guidelines outlined by the Invasive Animals CRC at www.invasiveanimals.com. Permits must be obtained for all trapping and disposal activities conducted and operators using fumigants must take adequate precautions to safeguard against accidental exposure.

Objectives and Outcomes

The overall objective of the feral animal control program is to minimise the threats posed by feral animals upon biodiversity. The main impacts of introduced animals as identified in the NAAMP include:
Predation of native fauna;
Competition with native fauna for food and habitat;
Degradation of watercourses/waterholes;
Grazing of native flora/seeds;
Spread of weeds, disease and pathogens; and
Soil disturbance through trampling and digging/degradation of soil structure.

Controlling these animals by reducing their numbers will reduce these impacts, help to prevent further damage to local biodiversity and allow recovery to take place in areas where feral animals are removed. This program needs to be ongoing to ensure that results will continue to be achieved.

PART THREE

COMPLETE AND RETURN THIS SECTION

RESPONDENT'S OFFER

Offer Form

The Chief Executive Officer
City of Melville
Locked Bag 1
BOORAGOON WA 6954

I/We _____
(BLOCK LETTERS)

of_____
(ADDRESS)

ABN/GST Status _____ACN (if any) ___

Telephone No: _____Facsimile No:__

E-mail (if any):

In response to REQUEST FOR QUOTE FOR ANNUAL FERAL ANIMAL CONTROL IN THE CITY OF MELVILLE

I/We agree that I am/We are bound by, and will comply with this Request and its associated schedules, Attachments, all in accordance with the Conditions of Responding contained in this Request signed and completed.

The quoted price is valid up to three (3) months from the date of the Request closing unless extended on mutual agreement between the Principal and the Respondent in writing.

I/We agree that there shall be no cost payable by the Principal towards the preparation or submission of this Response irrespective of its outcome.

The quoted consideration is as provided under the schedule of rates of prices in the prescribed format and submitted with this Response.

Dated this _____ day of _____20___

Signature of authorised signatory of Respondent:__

Name of authorised signatory **(BLOCK LETTERS)**:

Position:___

Address:___

Witness Signature:___

Name of witness **(BLOCK LETTERS)**:_____

Address:___

Response

The following checklist has been provided to assist you with your submission. Where it is necessary to provide additional information please ensure that all documents are clearly marked with the relevant Attachment title to assist the evaluation panel with their assessment.
(NOTE: All pages within Part 3 are to be completed and returned to the Principal as they form part of your Response).

Organisation profile

Attach a copy of your organisation structure and provide background information on your company and label it **"Organisation Structure"**.	**"Organisation Structure"**	Tick if attached ☐
If companies are involved, attach their current ASC company extracts search including latest annual return and label it **"ASC Company Extracts"**.	**"ASC Company Extracts"**	Tick if attached ☐

Referees

Attach details of your referees, and label it **"Referees"**. You should give examples of work provided for your referees where possible.	**"Referees"**	Tick if attached ☐

Agents

Are you acting as an agent for another party?	Yes / No	
If Yes, attach details (including name and address) of your principal and label it **"Agents"**.	**"Agents"**	Tick if attached ☐

Subcontractors

Do you intend to subcontract any of the Requirements?	Yes / No	
If Yes, in an attachment labelled **"Subcontractors"** provide details of the subcontractor(s) including: (a) the name, address and the number of people employed; and (b) the Requirements that will be subcontracted.	**"Subcontractors"**	Tick if attached ☐

Conflicts of Interest

Will any actual or potential conflict of interest in the performance of your obligations under the Contract exist if you are awarded the Contract, or are any such conflicts of interest likely to arise during the Contract?	Yes / No	
If Yes, please supply in an attachment details of any actual or potential conflict of interest and the way in which any conflict will be dealt with and label it **"Conflicts of Interest"**.	**"Conflicts of Interest"**	Tick if attached ☐

Financial Position

Are you currently engaged in litigation as a result of which you may be liable for $50,000 or more?	Yes / No
If you are awarded the Contract, will you be able to fulfil the Requirements from your own resources or from resources readily available to you and remain able to pay all of your debts in full as and when they fall due?	Yes / No

Insurance Coverage

The insurance requirements for this Request are stipulated in the Special Conditions. Respondents are to supply evidence of their insurance coverage in a format as outlined below or in an attachment labelled **"Insurance Coverage"**. A copy of the Certificate of Currency is to be provided to the Principal with this submission.	**"Insurance Coverage"**	Tick if attached ☐

Type	***Insurer – Broker***	***Policy Number***	***Value ($)***	***Expiry Date***
Public Liability				
Professional Indemnity				
Workers' Compensation				

Selection Criteria

Compliance Criteria
Please select with a yes or no whether you have complied with the following compliance criteria:

Description of Compliance Criteria		
(a)	Compliance with the Specification contained in the Request.	Yes / No
(b)	Compliance with the Conditions of Responding contained in this Request.	Yes / No
(c)	Compliance with all necessary Licences and Registrations.	Yes / No
(d)	Compliance with and completion of the Price Schedule.	Yes / No

Qualitative Criteria
Before responding to the following qualitative criteria, Respondents must note the following:

All information relevant to your answers are to be contained within your response to each criterion

Respondents are to assume that the Evaluation Panel has no previous knowledge of your organisation, its activities or experience

Respondents are to provide full details for any claims, statements or examples used to address the qualitative criteria

Respondents are to address each issue outlined within a qualitative criterion.

A) Relevant Experience Describe your experience in completing/supplying similar Requirements. Respondents must, as a minimum, address the following information in an attachment and label it **"Relevant Experience"**: Provide details of similar work; Provide scope of the Respondent's involvement including details of outcomes; Provide details of issues that arose during the project and how these were managed; Demonstrate competency and proven track record of achieving outcomes; and Demonstrate sound judgement and discretion.	**Weighting <20%>**	
	"Relevant Experience"	**Tick if attached** ☐

B) Key Personnel skills and experience Respondents should provide as a minimum information of proposed personnel to be allocated to this project, such as: Their role in the performance of the Contract; Curriculum vitae; Membership to any professional or business association; Qualifications, with particular emphasis on experience of personnel in projects of a similar requirement; and Any additional information. Supply details in an attachment and label it **"Key Personnel"**.	**Weighting <15%>**	
	"Key Personnel"	**Tick if attached** ☐

C) Respondent's Resources Respondents should demonstrate their ability to supply and sustain the necessary: Advice and guidance; and Any contingency measures or back up of resources including personnel (where applicable). As a minimum, Respondents should provide a current commitment schedule in an attachment and label it **"Respondent's Resources"**.	**Weighting <15%>**	
	"Respondent's Resources"	**Tick if attached** ☐

D) Demonstrated Understanding Respondents should detail the process they intend to use to achieve the Requirements of the Specification. Areas that you may wish to cover include: A project schedule/timeline (where applicable); The process/methodology for the delivery of the goods/services; A demonstrated understanding of the scope of work Supply details and provide an outline of your proposed methodology in an attachment labelled **"Demonstrated Understanding"**.	**Weighting <20%>**	
	"Demonstrated Understanding"	**Tick if attached ☐**

Price Information
Respondents must complete the following "Price Schedule" and "Schedule of Rates". Before completing the Price Schedule, Respondents should ensure they have read this entire Request for Quotation. Prices are to be fixed for the whole of the provision of services.

Price Schedule

Description	**Rate (Exc GST)**
Feral Cat control	**$**
Feral Rabbit Control	**$**
Feral Fox Control	**$**
Administration and Reporting	**$**
Total (Exc GST)	**$**
GST	**$**
Total (Inc GST)	**$**

Schedule of Rates

This is a fixed price, lump sum contract and the prices in this Schedule of Rates are intended for work performed outside the Scope of Services on variation only. Rates shown are not subject to minimum hours.

Category / Personnel	Role	Hourly Rate ($) Ex GST	Hourly Rate ($) GST	Hourly Rate ($) Inc GST
		$	$	$
		$	$	$
		$	$	$
		$	$	$
		$	$	$
		$	$	$
		$	$	$
		$	$	$
		$	$	$
		$	$	$

Special Conditions

Special Conditions
All contact with City of Melville will be made through, and agreed with, Deanne Wynn, Environmental Officer.

Period of Contract and Termination
The Contract will be in force until 30 June 2012. However, in the event of the Contractor failing in any manner to carry out the Contract to the Principal's satisfaction, the Principal may forthwith terminate the Contract by written notice to the Contractor.

Insurances
The Contractor and its subcontractor(s) (if any) will be required to effect and maintain:

Public liability insurance in the sum of at least $20,000,000 (Twenty Million Dollar) in respect of any one occurrence and for an unlimited number of claims

Workers Compensation or Personal Accident Insurance cover as required by law (whichever may apply)

Professional indemnity insurance in the sum of at least $10,000,000 (Ten Million Dollars), in respect of any one occurrence and for an unlimited number of claims.

***** End of Document *****

Appendix 3 Revegetation Site Assessment Form

Revegetation Site Assessment

Site Name: _____ Location: _____ Date: _____

Assessor: _____ Site NAAMP Priority Rating: _____

Key Site Characteristics

Characteristic	Description	Outcomes
Area	1 ha = 10 000 m^2	
Threatened or priority flora	Specie(s)	
Threatened or priority fauna	Specie(s)	
Threatened or priority ecological communities	Type, area, location	
Vegetation community	E.g.: Banksia/Jarrah Woodland	

Presence of Threatening Processes:
(Note: refer to relevant NAAMP strategy and guideline documents)

Threatening Process	Present (Y/N)	Description	To be Considered during Revegetation Planning (Y/N)
Cubby houses/smoking dens			
Erosion			
Feral animals			
Fire			
Plant disease or pathogens			
Rubbish dumping (garden, litter, soil)			
Track formation			
Vandalism			
Vegetation removal or death			
Vehicles (4WD, car, motorbikes)			
Weeds			

Treatment(s) Required

Restoration Treatment	Description	Required (Y/N)	Length/Area/ Amount
Direct seeding	Species, area locations		
Fertiliser treatment	Tablet, granular		
Fire restoration	Area, species, other		
Installation of fences, barriers, signs	Length, type, locations		
Jute matting/coir logs for erosion control	Number, area to be treated		
Mulch	Area to be treated		
Natural regeneration potential	Yes/no		
Removal of feral fauna population(s)	E.g.: bees, rabbits, foxes		
Removal of rubbish, litter, soil	Amount, location		
Replanting with tubestock	Area, species		
Restoration of clear, bare areas	Area, species		
Seed collection	Yes/no		
Soil breaker or ripping (compaction)	Area, depth, locations		
Soil wetter (hydrophobic soils)	Amount required		
Treatment of graffiti, vandalism, etc	E.g.: signs, fences, trees		
Vegetation health assessment (e.g.: *Phytophthora* dieback assessment)	Obvious signs of decline, fungi or other symptoms present		
Watering	During warmer months during establishment period		
Weed control	Grasses, herbs, bulb, trees/shrubs, vines, area, location		