

9. Appendices

Appendix A.	Department of Planning Offset Recommendations - 8 December 2006	23
Appendix B.	Site Photos	44
Appendix C.	Flora Species Recorded On-Site.....	49

Appendix A. Department of Planning Offset Recommendations - 8 December 2006

Your Reference : 20017605: C058
Our Reference : DOC06/xxxx
cc : Armidale Dumaresq Council
Contact : Todd Soderquist, 6773 7006
Date : 8 December 2006

Mr Chris Wilson
Major Development Assessment
Department of Planning
GPO Box 39
SYDNEY NSW 2001

Attn: Mr Brad Deane

Dear Mr Wilson

OFFSET PROPOSAL – ARMIDALE REGIONAL LANDFILL

As you are aware, the Regional Landfill proposed by the Armidale Dumaresq Council will have detrimental impacts upon threatened species and communities. The Council has requested that the Department of Environment and Conservation (DEC) provide guidelines on how to offset these impacts. Mr Deane has previously advised the Council's consultants that they may work directly with the DEC in developing offset guidelines specific to the landfill. This letter outlines the results of these early discussions and is being provided to both the DOP and Council.

On 8 November 2006, Dr Todd Soderquist DEC Senior Threatened Species Officer, conducted a site inspection of the proposed landfill site with Mr Col MacIver from the Council and EA Systems consultants Mr Martin Dillon and Dr Liz Broese. Dr Soderquist assessed habitat quality and management requirements in the vicinity of proposed landfill, including surrounding areas that have been suggested by the Council as potential offset areas. On the basis of this inspection and information provided by EA Systems, the DEC provides the following advice on actions to maximise the environmental outcomes of offsets to the proposal. The DEC may support the Council's landfill proposal if it is satisfied with the offset proposal.

In order to assess the merits of proposed offsets against general principles outlined in Attachment A, the DEC requires information on both the anticipated impact and the offset. Attachment B sets out a range of criteria that the DEC considers to be the minimum necessary to evaluate the offset, and in this case, define the biodiversity values of impacted areas and candidate offset area(s). Particular attention is needed to the potential application of management actions in Section 7. Some of the criteria relate specifically to the landfill site (e.g. transfer of logs) while others are generic and relevant to the design of any offsetting initiative. For each criterion in the table, we have described the DEC's preferred outcome and attached notes on the information needed.

A. Specific Issues for the Council

1) On-site actions: Avoid, Minimise, Rehabilitate

The development proposal should address the need to avoid impacts if possible, minimise those that will occur and rehabilitate each cell of the landfill as it is completed. For example, the *Soil Conservation Act* requires the proponent to rehabilitate the landfill site to stabilise and recreate a landscape that is compatible with the surrounding land and comparable to pre-existing land use.

The objective is to minimise future maintenance requirements by, among other actions, minimising soil erosion and consequent sedimentation of the surface drainage system. The science guiding rehabilitation/stabilisation of mine sites is considerable and should generally apply to landfill site rehabilitation. Evidence from current best practice management demonstrates that it is economically feasible and practical to stabilise soils and the landscape.

2) Offsite: Offsetting Impacts to Biodiversity

There has been increasing pressure to restore landscapes to minimise long term social cost and clearly establish measurable rehabilitation objectives that demonstrate sustainability. However, it would be erroneous to equate rehabilitation and stabilisation of a landfill site with the re-instatement of pre-disturbance biological diversity and natural ecological processes. Creating geomorphologically stable landscapes during rehabilitation does not ensure re-establishment of the complexity and diversity of natural ecosystems, especially where the loss of older trees will require centuries to replace. Restorative practices are only now developing, the cost is significant and the long-term success is uncertain.

Consistent with the *EP&A Act*, *TSC Act* and *NP&W Act*, the proponent of any development is obliged to avoid natural and cultural features to the greatest extent possible. No definitive experience or historical evidence exists to assure us that pre-disturbance 'naturalness' and biodiversity levels can be re-established following landfill construction. Nor is there any empirical information enabling us to gauge the rate at which biodiversity might recover.

Nevertheless, it is clear from the nature of landfilling that impacts to biodiversity are intense and that they will span time scales that are at least inter-generational, if not permanent. Furthermore, the losses that will occur at the landfill site also contribute to the already significant level of cumulative loss that has occurred at a regional scale on the New England Tablelands.

The only meaningful way to counter the direct impacts to biodiversity on the landfill site and to avoid adding to the cumulative loss at regional scale is to take actions to remove threats to or 'enhance' biodiversity at another site. Offsetting is a means by which we can narrow the biological shortfall between a rehabilitated (stabilised) landscape and a pre-disturbance landscape. Put another way, the biological debt incurred on-site can be remedied by a closely comparable credit (or better) off-site.

3) Defining an Appropriate Offset

Damage to biodiversity from the landfill will be immediate yet most management actions are expected to compensate for biodiversity loss only with gradual improvements. The New England Tablelands is a highly modified province and the DEC is concerned to ensure that, as far as possible, future developments take action to address cumulative impacts over both space and time. The information requested in the attached table should provide DEC with sufficient information to enable it to evaluate the merits of candidate offset areas.

The criteria in Attachment B vary in nature considerably. The DEC fully recognises that the values pertaining to one criterion are not directly or empirically 'comparable' with those of another criterion. Further, the DEC understands that it may not be possible, feasible or practical for the proponent to satisfy the DEC's preferences in terms of all criteria within one land parcel. In order to address one criterion well, compromises may need to be made to one or more others.

The DEC will evaluate the overall merit of an offset proposal having considered all criteria collectively. Importantly, the approach adopts a systematic assessment process and confers transparency for defensible decision-making.

As a guide to the size of offsets required, the Biometric Tool used in Property Vegetation Planning within NSW applies ratios for many threatened species on the order of 20:1 for offset to impact area. Logically there would be little reason to vary these ratios across proposals. In this instance there is potential for intensive management of offsets that might greatly improve the biodiversity contribution of these areas. From that perspective, if suitable management effort is incorporated in the proposal, an offset ratio of 3:1 or greater may be appropriate for the landfill.

4) Information Required from Armidale Dumaresq Council

High levels of detail are not necessary when addressing topics in Attachment B. Photographs with expert field observations will be sufficient for the DEC to form a view. For example, full species lists are not required. In completing the table DEC requests:

- a) The Council to address each of the criteria with information for both the landfill area and the proposed offset area(s).
- b) The Council simply describes impacted and offset areas under consideration, not evaluate the merit of the offset proposal to biodiversity in great detail.

If you wish to discuss any matter raised in this letter please ring Todd Soderquist in the Armidale office on 6773 7006.

Yours sincerely

Simon Smith
Manager Armidale Region
Environment Protection and Regulation Division
Department of Environment and Conservation

Attachment A

Offset Principles for Biodiversity Conservation Offsets under the Environmental Planning and Assessment Act, 1979

1. Introduction

The Department of Environment and Conservation is the agency legally responsible for biodiversity conservation across the state. There continues to be pressure on natural values from urban, industrial and agricultural development. As a consequence of past land-use decisions, a pressing short-term challenge is to secure and manage the larger, more intact landscape remnants so that fragmentation does not increase and natural values are not further diminished. In the longer term, the challenge for biodiversity is to rebuild landscapes that are ecologically viable for native species at all scales. Without mechanisms such as policy frameworks, this loss is likely to continue at a greater rate and in a less managed fashion.

The Environmental Planning and Assessment Act (EP&A Act) 1979 is the principal instrument in NSW governing land use planning and development control. Its objects include a commitment to ecologically sustainable development and to the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats. More broadly, the NSW Government has made a commitment to prevent further broad scale clearing of native vegetation, recognising that too much has been cleared in parts of the State with very serious environmental consequences.

Continued development and the inevitable expansion of urban and coastal settlement, in particular, will involve unavoidable loss of natural and semi-natural areas through land use change into the future. Developers have for some years offered to protect or transfer unaffected lands to other agencies or councils to compensate for environmental impacts.

The use of formal "offsets" schemes has emerged as a potentially feasible option when dealing with a wide range of development impacts. The NSW Government has already released discussion papers on "*Green Offsets for Sustainable Development*"¹, "*Offsets, Salinity and Native Vegetation*"² and "*Compensatory Wetlands*."³

In all of these publications, offsets are employed as a last resort after other methods to avoid, minimise and mitigate impacts have been considered. It is only one tool that can be employed, in limited circumstances, as part of a mix of strategies to achieve conservation outcomes and manage loss.

¹ NSW Government April 2002, Green Offsets for sustainable development: Concept paper NSW Environment Protection Authority, NSW Department of Land and Water Conservation, NSW National Parks and Wildlife Service, Planning NSW

² NSW Department of Land and Water Conservation (2001), Offsets, Salinity and Native Vegetation: Discussion Paper, NSW Department of Land and Water Conservation, Sydney
[<http://www.dlwc.nsw.gov.au/care/salinity/pdf/offsets.pdf>]

³ NSW Department of Land and Water Conservation and NSW State Wetlands Advisory Committee (Nov 2002), Compensatory Wetlands: A discussion paper under the NSW Wetlands Management Policy, NSW Department of Land and Water Conservation, Sydney
[<http://www.dlwc.nsw.gov.au/care/wetlands/cw/cw.pdf>]

2. What is an offset?

The term offsets refers to agreed actions that are undertaken to counter-balance the adverse impacts of approved development. In relation to biodiversity, offset actions provide a mechanism to compensate for loss of biodiversity values in one area by action elsewhere.

Benefits for biodiversity management may be achieved in three ways:

1. Securing protection of other, existing areas of equivalent conservation value. Habitat loss is one of the key threats to biodiversity. The permanent securing of areas of biodiversity value is an important gain, particularly if the area is also under threat.
2. The enhancement of existing habitat. This may include better management of existing habitat, assisted regeneration of degraded habitat, fencing and pest and weed control. This approach can increase the viability of existing remnants and needs to be considered in a regional context.
3. The protection of cleared land and the restoration or reconstruction of habitat. This involves high risks and uncertainties for biodiversity outcomes. This approach might be used strategically to link areas of high conservation value or to increase buffer zones around areas of high conservation value.

In most regions, preference is likely to be given to the first approach. That is, as a general rule the priority for offsets should be given to the protection, and enhancement if necessary, of threatened areas of equivalent biodiversity value to the impact area.

The enhancement of habitat in poor condition and habitat reconstruction would typically be undertaken where this would buffer high value habitat, or provide connectivity. Priority for these kinds of offsets may be higher if they are part of a landscape/regional habitat strategy. Where the only available habitat for some threatened species or endangered ecological communities is degraded, restoration and protection can also become a high priority.

3. Objectives of biodiversity offsets

1. To encourage well designed development proposals that take full account of all potential impacts.
2. To minimise loss through consideration of options to avoid or minimise biodiversity loss or mitigate biodiversity damage, and only use offsets to compensate for unavoidable biodiversity impacts as a last resort.
3. To use offsets to secure, protect and manage areas of significant biodiversity value into the future.
4. To take account of the potential contribution of different management and restoration actions in developing an offset proposal.
5. To calculate the area required for an acceptable offset according to the relative conservation values and condition of the impact area and offset area(s) (i.e. the ratio will vary depending on the relative values).

4. Principles of biodiversity offsetting

1. Offsets are only used to address residual impacts following consideration and implementation of options to avoid, minimise and mitigate impacts.

2. Offsets should be based on an agreed understanding of the conservation significance of the impact and offset values.
3. Offsets should maintain or improve identified biodiversity values secured into the future.
4. Offsets should be based on a "like for like" basis.
5. Offset area should be greater than the area impacted.
6. Offsets should generally be in proximity to the area impacted.
7. Offset actions should be located in areas of strategic regional conservation value where Principle 6 does not apply.
8. Offsets should be in addition to existing initiatives.
9. Offsets should minimise ecological risks from time lags.
10. Offsets should be secure, long term and auditable.

In applying these principles to an offset package, not all principles will be of equal relevance in all circumstances. The priority for each principle will depend on the regional conservation and development context, the nature of the identified biodiversity impacts of the development, the availability of offset options, the long-term management options for offset land and the relative likelihood of success of any option in the circumstances. For example, there may be circumstances where the "like for like" and "proximity" principles are given a lower priority in order to achieve strategic, targeted, viable and secure offset actions at a regional or vegetation community level.

Any trade-off between these principles should be considered in the context of the cumulative effects and any targets for biodiversity in a strategic regional context. The long term impact development and the use of offsets on other than a "like for like" basis should not result in the depletion of particular species or communities to the point where their persistence is put at risk.

The agreed offset package for any development proposal should explain the priority given to each offset principle in a clear and transparent fashion.

Principle 1: Offsets are only used address residual impacts following consideration and implementation of options to avoid, minimise and mitigate impacts.

Offsetting should only be utilised as a last resort after all other options to avoid, minimise and mitigate impacts have been considered and deployed. Offsets address the residual impact following this process.

This process can be expressed succinctly as follows:

- Avoid impacts and retain biodiversity with priority for retention of habitat, which is of identified high conservation value and in good condition. This can be achieved through sensitive design and development planning.
- Minimise impacts where unavoidable. One way to minimise impacts is to reduce the size of the area to be impacted.
- Mitigate impacts to reduce the short, medium and long-term effects. The impacts on biodiversity need to be managed by implementing design, operational or organisational safeguards or controls such as exotic species management, erosion and sediment control, design innovation and rehabilitation of disturbed areas.

Where it can be demonstrated that no suitable development alternative exists, all prudent and feasible options have been examined and the development is deemed to be of sufficient community benefit to proceed, an agreed biodiversity offset package can be provided. This offset package should be developed and implemented to address the residual impacts that are agreed to be justified and unavoidable.

Principle 2: Offsets should be based on an agreed understanding of the conservation significance of the impact and offset values.

Consideration of offsets should only proceed following a comparison of the biodiversity significance of the impact and offset areas, based on the best available information and ecological principles.

It is important that there is an agreed understanding of the minimum level of data required and the methods to obtain this data. The level of risk and the dynamics of the natural system also need to be identified in developing offset options. It is essential that uncertainties arising from sparse ecological data and incomplete knowledge of species responses over time are taken into account in ranking or assessing options. It is also important that the potential risks to an offset option, for example from offsite threatening processes and climate change, are considered.

Principle 3: Offsets should maintain or improve identified biodiversity values secured into the future.

Offsets seek to compensate for the loss of biodiversity due to a development impact by maintaining or improving biodiversity values away from the impact area. The balance between loss and gain may be calculated according to the conservation significance of the impact and offset areas and the likelihood of the persistence of the values to be protected as an offset. Offset options will vary according to the biodiversity values of what is lost and the values, future viability and security of the offset option.

To achieve this outcome it is essential that the nature of the loss is clearly defined, the predicted secured benefits from offsetting are clearly identified and the means by which they will be delivered is legally agreed as part of the consent process prior to any works commencing.

Principle 4: Offset should be based on a “like for like” basis

1. Biodiversity losses must be offset with biodiversity gains. Biodiversity offsets may also result in improvements in water quality or salinity but these benefits do not reduce the biodiversity requirement. Benefits cannot be traded across types. For example, salinity benefits cannot offset biodiversity losses.
2. Preference in selecting offsets must be given to protecting areas that are of the same vegetation and habitat type and conservation significance as those being impacted within the regional context. This principle recognises that offsets should contribute to the long-term retention and recovery of habitat types and species depleted through development. The risk otherwise is that some habitat types will be substantially cleared, and therefore put at risk of at least regional extinction, in exchange for the protection or revegetation of other types.
3. Where there is no available “like for like” offset of reasonable size or viability, consideration should be given to protecting communities that are under a similar level of threat in strategic targeted areas (see principle 7), or to restoration of degraded areas of similar habitat type or reconstruction of habitat. These mechanisms can increase the viability of existing remnants, provide connectivity between areas of high conservation value or increase buffer zones around areas of high conservation value.

However, offsets should not be used when “like for like” is not possible **because** the development places the continued persistence of a species or community at significant risk of extinction by removing one of the last refuge areas for the species or community. Other mechanisms should

then be invoked to avert the risk, for example, conditioning consent to require ex-situ conservation actions as a mitigation of impact.

Principle 5: The offset area should be greater than the impact.

The destruction of habitat or removal of native vegetation must be counter-balanced by offset areas greater than the area impacted. The greater area counters, to some extent, the risks and uncertainties associated with offsetting. The exact offset ratio to be applied will depend on the circumstances of the case. Knowledge of the total surviving extent of the habitat or vegetation type(s) involved, its historical depletion and the area that will be removed by the development are crucial considerations in relation to the viability of the offset.

Where an offset is proposed that is of poorer habitat condition than the vegetation cleared, a higher offset area ratio is justified, on the basis that good condition, essential to future sustainability, is difficult to recover. The highest ratios should apply for the revegetation of cleared land to account for the considerable timeframes and risks associated with revegetation. More than one offset location may be required to compensate for several impacted species or to compensate adequately for a single species.

Principle 6: Offsets should generally be in proximity to the area impacted

To ensure equity in the sharing of the impacts of development and the benefits of offsets, it is preferable that offset measures be provided in reasonable proximity to the areas impacted. There are a number of reasons for this:

- Applying the offset locally minimises the risk that any one area receives an unreasonable burden of impacts without receiving any benefits that offsetting can provide;
- Retaining habitat across its natural range spreads the risk of loss from catastrophic events such as fire;
- Protecting local populations may contribute to the conservation of genetic diversity.

Suitable boundaries for offsetting will vary. In rural areas, suitable areas may be subregions within bioregions. In urban areas, local government areas may be more appropriate. For very specific values such as particular threatened species, the offset boundary may be the natural distribution of the species involved.

Practical considerations such as the availability of suitable offset areas, viability and security may also affect the offset package. In some cases, a better conservation outcome that satisfies the other offsetting principles may be achieved by considering offset options over a greater distance from the impact. Strategic outcomes may take priority over proximity in these circumstances.

Principle 7: Offset actions should be in areas of strategic regional conservation value where like for like is not available in proximity to the impact

Where "like for like" cannot be achieved in proximity to the impact, biodiversity offsets may be targeted to achieving protection of those areas of significant vegetation that are at most risk or less secure in the locality, or those areas that have most strategic conservation value in an intensively modified region. For example, in highly developed regions, there may be very few large areas of any natural vegetation type remaining. The priority for offsetting actions could be directed to enhancing the status of remaining viable species or communities or protecting any large viable patches of habitat that are rare and at risk of loss and fragmentation.

Principle 8: Offsets should be in addition to existing initiatives

Offsets should not utilise areas where public funds are already being applied for conservation and management eg. Landcare restoration projects and revegetation of council reserves. Offsets can be used to expand and complement these existing conservation programs provided there is well documented and transparent accounting to ensure there is no double accounting.

Offsetting is generally not appropriate on public land, as there are existing statutory responsibilities for public authorities to manage heritage values. Offsetting should not generally be used to supplement the budgets of public land management authorities.

Principle 9: Offsets should minimise ecological risks from timelags

Any time lags between removing and replacing habitat function should be factored into the specification of offsets (for example where mature paddock trees are replaced by new plantings). These may range from initiating offsets well prior to impact to initiating offsets as soon as practicable, but with the risks involved to biodiversity factored into the location, replanting ratio and total area of the offset proposal.

Principle 10: Offsets should be secure, long term and auditable

Offset strategies must be demonstrated to be secure and their conservation values should be evident within an acceptable timeframe. The legal and administrative arrangement that bind an offset must be clear and binding in perpetuity with penalties for non-compliance (see point 5 for suggested mechanisms).

Mandatory documentation (a Register) of offset agreements should convey full details about all locations and actions involved in an agreement. A spatial record on a centralised GIS spatial database, managed by DEC and accessible by DEC officers, is also required. These records ensure that details of offset agreements are not lost over time and future development proposals do not reverse any gains. They are also a vital tool for monitoring compliance with the agreed terms of an agreement and the success of conservation outcomes.

Requirements for ongoing monitoring and evaluation, as well as technical specifications for the work, should be factored into the offset agreement. It may be appropriate that the developer funds the first 5-10 years of monitoring to ensure that the intent of the agreement is being met. After a period, the responsibility could rest with local or state government and for the landholder.

5. Mechanisms to achieve security

A major obstacle to securing conservation outcomes is uncertainty regarding future ownership and management of lands agreed to be set aside from development ie. the offset site.

The preferred mechanisms to achieve security are:

- *Acquisition of land* with transfer to a public authority for ongoing management eg. Council, NPWS or Trust. This provides the most secure option for offsets but may be limited given the ongoing resourcing implications unless financial contributions are also negotiated.

In the case of DEC, there are only certain types of lands that would qualify for reservation under the provisions of the NPW Act 1974. In general, preference is given to lands that meet state-wide conservation priorities; contain high conservation value vegetation; have threatened species habitat values; demonstrate corridor opportunities; have suitable size and boundary configuration; have regional recreation or open space values and are supported by adequate management funding (whether from private or public sources).

Council management would also require some ongoing commitment for establishment and operational costs to ensure that the costs of offsetting the impacts of a development are not simply transferred from the proponent to the community.

- *Conservation covenants on private land.* Conservation agreements exist under the *National Parks and Wildlife Act, 1974*, the *Nature Conservation Trust Act, 2001*, as well as appropriately worded s88B covenants under the *Conveyancing Act 1919* where the benefiting authority is either the council or the DEC.

A covenant restricts or prohibits activities that could degrade the environmental value of the land; is permanent and registered on the title to the land and is approved in writing by, or is entered into under a program approved in writing by a government authority. Conservation covenants may be eligible for concessional tax treatment and for other financial assistance (eg. Rate exemptions).

Less secure mechanisms need to be employed with caveats to ensure protection in perpetuity. They will generally be less attractive as offset options where more secure commitments are possible.

- *Wildlife Refuges, under the National Parks and Wildlife Act 1974*, can also be registered on the title deeds of the land for information purposes, but can be rescinded by the landowner or occupier at any time and are not secure.
- *Conservation zoning and development controls.* This refers to land use zoning in the Local Environment Plan (LEP) that identifies biodiversity protection and management as the primary objective and use of that land. The disadvantage of this mechanism is that the zoning can be changed at some later date without reference to original offset agreement. This mechanism should include a caveat in the LEP that requires referencing to the Minister responsible for conservation if there is a proposed change in the zoning of offset land.
- *Stewardship payments for development controls.* This basically provides incentives for a period of time to landowners to manage the conservation values of their land. However, security in perpetuity is not assured. If accompanied by a covenant or long-term (i.e. 30 year) contractual commitment, these may still be attractive offset options.

Attachment B

Offset Criterion	DEC Preferred Outcome	Proposed Outcome (Proponent to complete these columns)	Offset Site(s)
1. Area of Offset	<p>Ratio of offset to impact greater than 3:1 to account for time-lags and uncertainty, i.e., instantaneous adverse impact on-site, v. long term, gradual improvement to condition/ biodiversity level in offset area. The offset must consider that the larger trees being cut down are irreplaceable within a century.</p> <p>Ecosystems that are least represented in the current reserve network and subject to greatest threat of modification.</p> <p>Preferred ecosystems (including above) that occur in lower topographic positions and/or on more productive soils (volcanic soils, mid-lower slopes and alluvial flats).</p> <p>Although it is typically preferable that the offset area be connected with other sizeable remnants of native vegetation, in this instance the DEC recognises the efficiency of purchasing and managing offsets that are contiguous with the landfill. Nonetheless, the concept of landscape connectivity should be applied as much as is feasible on a local basis. The DEC would expect woodland areas to the south and east of the landfill to be core portions of any offset design. Any proposal to connect these woodlands with the others would help the offset quality.</p>	<p>The landfill operational area will occupy 19.7 ha. This includes 12.7 ha of regrowth stringybark woodland and 6.5 ha of cleared grassland which will be progressively cleared over the lifespan of the facility.</p>	<p>A 3:1 offset to impact ratio will result in an area of 38 ha of stringybark woodland and 20 ha of cleared grasslands used as an offset.</p>
2. Ecosystem Type	<p>Ecosystems that are least represented in the current reserve network and subject to greatest threat of modification.</p> <p>Preferred ecosystems (including above) that occur in lower topographic positions and/or on more productive soils (volcanic soils, mid-lower slopes and alluvial flats).</p>	<p>The landfill pit will be placed in stringybark woodland with associated infrastructure (road, leachate ponds) in adjoining grasslands. Condition of both communities is low.</p>	<p>Regrowth stringybark woodland and grassland adjacent to the site, currently in a similar condition as the landfill site, will be used for an offset. Fencing, weed and pest control, and relocation of timber piles will improve the condition of the offset.</p>
3. Landscape Context	<p>Although it is typically preferable that the offset area be connected with other sizeable remnants of native vegetation, in this instance the DEC recognises the efficiency of purchasing and managing offsets that are contiguous with the landfill. Nonetheless, the concept of landscape connectivity should be applied as much as is feasible on a local basis. The DEC would expect woodland areas to the south and east of the landfill to be core portions of any offset design. Any proposal to connect these woodlands with the others would help the offset quality.</p>	<p>Little continuity currently exists between the patch of stringybark woodland and adjoining woodlands.</p>	<p>Fencing and regeneration of woodland in the proposed offset area to the east of the site would decrease the distance between woodland remnants by several hundred metres.</p>

Offset Criterion	DEC Preferred Outcome	Proposed Outcome (Proponent to complete these columns)	
Landfill Site	Offset Site(s)		
4. Offset Consolidation and Potential for Future Growth	<p>A single, sizeable offset is preferable to isolated and smaller offset areas, with potential for expansion into neighbouring lands (remnant vegetation) through voluntary creation of corridors under incentive programs. Benefits:</p> <ol style="list-style-type: none"> 1. Ecological viability increases with size; 2. Management efficiency maximised and costs reduced; 3. Planning for future landfill expansion expedited and "certainty" increased. 	<p>The landfill site will be located in the centre of the existing woodland. Offset areas will surround the landfill in a connected remnant.</p>	<p>The offset will be one continuous remnant of 60 ha surrounding the proposed landfill pit and infrastructure.</p>
5. Condition	<p>Native vegetation with minor/nil disturbance, stable and productive soil surface condition and minor/nil weed invasion. Areas containing largely cropped lands are not considered to contribute highly as conservation offset.</p>	<p>All of the current landfill footprint area is highly disturbed with high numbers of fauna pests and weed invasion. Both the grassland and the woodland are currently used as grazing the land.</p>	<p>The proposed offset areas are similar to the existing landfill site and have been extensively grazed. Mitigation measures, including eradication of pests and weeds, and erecting fencing to exclude grazing will improve the condition of the offset area.</p>

Offset Criterion	DEC Preferred Outcome	Proposed Outcome (Proponent to complete these columns)	Offset Site(s)
<p>7. Proposed Management</p>	<p>Commitment to removing/ minimising threats to biodiversity. Management actions include:</p> <ol style="list-style-type: none"> 1. Clearing of trees on the landfill area is to progress only as the landfill is expanded on a cell by cell basis. 2. Domestic livestock are to be removed immediately after land purchase. 3. The offset areas are to be fenced with livestock proof and rabbit resistant fencing. 4. Exotic herbivores (goats, rabbits, pigs) are to be eliminated or controlled in the offset areas. Densities of rabbits are to be monitored closely and any irruption must be controlled immediately. Guidelines for control need to be developed. 5. Cat populations associated with the landfill are to be kept under constant control. 6. Control of foxes in the offset area is desirable, especially if part of a broader regional program with neighbouring properties. Localised control of foxes reliant upon the landfill is required. 7. Weeds are to be controlled at all times. 8. Hazard reduction burning in offset areas is not permitted. If hazard reduction burning is required as a buffer to the landfill, the design must minimize the area burned or preferably use slashing to achieve a narrow buffer. 9. Move hollow trees from landfill area to offset areas as logs or erect as stags if feasible. 10. Move all logs that are >20 cm diameter at any point off the landfill site to the offset area. 11. Rehabilitation of tree cover in selected areas should begin as soon as possible after stock removal. Monitoring of understorey response 	<ol style="list-style-type: none"> 1. Clearing of trees on the landfill area is to progress only as the landfill is expanded on a cell by cell basis. 2. The site is currently overrun with hundreds of rabbits and some foxes. 3. Exotic blackberry and hawthorn shrubs will be eradicated prior to construction in both the landfill and offset site. 4. Ongoing targeted monitoring and weed control of exotic grasses (Coolatai grass, African lovegrass, serrated tussock, Chilean needlegrass) will be implemented in areas subject to soil disturbance. 	<ol style="list-style-type: none"> 1. Domestic livestock are still grazing on the site, but will be removed prior to commencing construction. 2. The offset area will be fenced to exclude livestock. Construction of fencing to exclude rabbits and introduced predators will be erected around areas to be revegetated. 3. A control plan for rabbits, foxes and cats will be implemented. 5. Exotic blackberry and hawthorn shrubs will be eradicated prior to construction in both the landfill and offset site. 4. Ongoing targeted monitoring and weed control of exotic grasses (Coolatai grass, African lovegrass, serrated tussock, Chilean needlegrass) will be implemented. 5. Hazard control burning should not be required for the landfill. 6. Hollow logs and erect stags will be relocated from the landfill footprint to the offset area. These logs may be of highest value on the grassland community where dead wood is more scarce. 14. Rehabilitation of tree cover in selected areas will begin as soon as possible after stock removal. Monitoring of

		Proposed Outcome (Proponent to complete these columns)	
		<p>to grazing removal should be initiated concurrently.</p> <p>12. If understorey response is minimal, apply assisted rehabilitation (selected replanting of shrubs and seeding if feasible) especially in treeless areas.</p> <p>13. Low intensity thinning of dense stands of young trees can be applied in a small-scale mosaic pattern if carefully designed to have ecological benefit. Growth and stand structure response needs to be monitored. Draft protocols for such thinning are provided in Appendix C. Thinning is not a required action, but should be applied if judged to be beneficial.</p>	<p>understorey response to grazing removal will be initiated concurrently.</p> <p>7. If understorey response is minimal after 12 months of stock removal planting of shrubs and seeding will be implemented.</p> <p>8. Dense regrowth in the far southern portion of the offset area may benefit from thinning. Thinning will be implemented as per Appendix C.</p>
8. Permanency / Security of Offset	<p>A. Secure dedication to conservation land use and management into perpetuity. Mechanisms include (but not limited to):</p> <ul style="list-style-type: none"> • Ownership vested in Council, Land Trust or Bio-bank; • Formal Conservation Agreement (VCA under NPW Act) bound to title prior to on-selling; • Covenant on title. <p>DEC prefers strongest form of dedication and highest level of protection from future disturbance over inter-generational timeframes.</p> <p>B. Area chosen is of nil or minimal potential for mineral prospecting.</p>		<p>The ownership of the proposed landfill site is vested in the Armidale Dumaresq Council.</p>

Notes on Attachment B – Information required.

a) Criteria 3, 4 and 5.

Scanned aerial-photos showing both the impact areas and proposed offset area(s) would be preferable. These will facilitate assessment of the areas within the context of the broader landscape in terms of:

- surrounding vegetation remnants;
- connectivity to remnants;
- topographic position;
- configuration with respect to DEC estate; and
- potential for future growth of the offset area.

b) Criterion 2 (Ecosystem Type)

Describe vegetation, soils and topographic position. This does not need to deal with likely/known fauna or fauna habitat.

Photographs - of each area (impacted and offset area(s) showing topographic context and typical vegetation in each area. This would assist and complement written descriptions below.

Vegetation description

- Structure;
- Dominant floristics – 1-3 dominant plants of each vegetation stratum;
- Patterning – homogeneous through to highly variable. If patterning significant, describe various vegetation patches in area in terms of structures/floristics;
- Unique/rare or otherwise “special” vegetation features;
- Endangered Ecological Community.

Soils

- Parent geology
- Observed (not measured) soil colour and texture;
- Variability over area. If highly variable, describe range in colour and texture

Topography

- Topographic position
- Terrain element
- Slope – estimated
- Aspect

c) Criterion 6 (Condition)

Vegetation

- Disturbance - nature and extent (% of area) of in terms of clearing, grazing and/or cropping;
- Age structure – old growth, regrowth, mixture
- Weeds – species, degree of dominance and extent (% of area)

Soil

- Erosion features – (rills, gullies, sheet) extent (% of area), type and severity;
- Surface condition – litter and/or cryptogamic cover, organic matter incorporation, structure, friability/compaction.

Attachment C: Protocols for thinning of regrowth in the offset areas *DRAFT*

Thinning dense stands of small regrowth trees, if carefully designed, can assist biodiversity by returning a forest system to a natural structure more rapidly than is possible through natural attrition. The following guidelines for ecological thinning can be applied where it is judged by qualified ecologists that stands of small trees exist at unusually high densities.

Category	Guidelines
1. Site selection	Thinning should be applied only to localised areas that are dominated by trees less than 15 cm diameter at breast height (DBH). Thinning will not be applied to areas where basal area is less than 20 m ² per ha.
2. Tree size	Only trees less than 15 cm DBH will be cut.
3. Area	A mosaic of thinning is required, with some areas left unthinned across the landscape. Each thinning operation will be conducted within a defined site of no more than 2 ha.
4. Percent of area	To further guide the creation of a mosaic, within the 2 ha defined site no more than 50% of the area will be thinned, preferably as small plots of less than 900 m ² (30 X 30 m).
5. Basal area target	Thinning will be designed so that remaining basal area in the thinned plots is greater than 20 m ² .