ALINTA DBNGP LOOPING 10

Rehabilitation Management Plan

November 2005

CONTENTS

APPENDICES

1 INTRODUCTION

Alinta on behalf of DBNGP (WA) Nominees Pty Limited propose to install an additional gas pipeline within the existing DBNGP corridor south of Compressor Station CS 10 located immediately north of Thomas Road in Kwinana. The additional pipe is to be installed over a distance of approximately 23km to just south of Punrak Road. The corridor traverses 2 Bush Forever Sites and the Leda Nature Reserve as well as several small areas of remnant native vegetation on private property.

The project will seek to re-establish native vegetation over the pipeline area of disturbance (AOD) following installation of the pipe.

This rehabilitation plan is based on the rehabilitation plan prepared by Woodman Environmental Consulting Pty Ltd for Ecos Consulting (Aust) Pty Ltd, Sept 2005.

2 REHABILITATION REVIEW

The project area was inspected by Greg Woodman of Woodman Environmental Consulting Pty Ltd and Grant Lamb and Dr. Mark Garkaklis of the Department of Conservation and Land Management on the 29th July and 8th August 2005. The easement was reviewed with the aim to identify achievable and acceptable rehabilitation objectives for the different sections of the project area. Plant cover, species richness and weed cover were observed during the site inspections and objectives and methods discussed.

Vegetation condition on the easement varied markedly as follows:

Leda Bush Forever site and other areas of remnant native vegetation on private property not in Bush Forever were in very poor condition with extremely low species diversity and native plant cover. The current condition of the vegetation in these areas is attributable to on going high levels of 3rd party access, regular fires and weed incursion. Previous rehabilitation results on the easement in these areas has been poor and little material in the way of native vegetation or topsoil currently remains to facilitate rehabilitation following the Looping 10 project.

Leda Nature Reserve and the Lowlands Bush Forever site adjacent to Hymus Swamp were in better condition than other areas as a result of reduced 3rd party access, however neither site was in pristine condition as a result of historical disturbance. Areas of good quality vegetation were identified in these areas off the easement and the rehabilitation of the easement had provided both topsoil and native vegetation cover that can be re-utilised for rehabilitation of the Looping 10 project. These areas were viewed as having greater intrinsic biodiversity values than the remainder of the project area and rehabilitation measures should attempt to return some measure of the local biodiversity.

2.1 Rehabilitation Objectives

The project area was divided into two functional areas with respect to existing condition, environmental significance and biological values. Rehabilitation objectives were set for the two areas as follows:

Objective 1: Provide native cover of local dominant understorey species that will stabilise soil and help reduce 3rd party access.

Leda Bush Forever site and other areas of remnant native vegetation on private property not in Bush Forever.

Objective 2: Provide native cover of local species that will stabilise soil and help reduce 3rd party access and provide increased understorey biodiversity than is currently present on the easement.

Leda Nature Reserve and the Lowlands Bush Forever site adjacent to Hymus Swamp.

3 EXISTING VEGETATION

3.1 Flora and Vegetation

Previous studies along the corridor have been conducted between October 2002 and May 2003 (Strategic Environmental Review for the proposed corridor widening of the DBNGP) and 26th August to 6th September 2004 (Additional flora and vegetation studies in the Leda and Kemerton areas supporting responses to submissions on the Strategic Environmental Review) by Mattiske Consulting Pty Ltd. These studies included mapping of vegetation types on two occasions. Mapping of plant communities on the existing previously cleared easement was conducted over the entire project area, followed by additional studies within the Leda Bushland Bush Forever site and the Leda Nature Reserve. The additional studies included alignments of mapped communities with Floristic Community Types (FCTs) according to Gibson *et al*. (1994) following analysis of floristic data collected in plots. Analysis involved Bray-Curtis Polar Ordination and flexible UPGMA agglomerative heirarchichal fusion within the PATN pattern analysis package. In addition, Declared Rare Flora or Priority Listed Flora were noted at recording sites. This work identified a single Priority 4 species (that was regarded as a planted individual due to being outside its known geographical range) and several small occurrences of a threatened ecological community (FCT26A) along the current pipeline corridor.

The vegetation existing along the pipeline easement has been described as follows (Bowman Bishaw Gorham 2004):

Leda Bushland Bush Forever Site

The following plant communities have been defined:

G3 Open Woodland of *Eucalyptus gomphocephala, Banksia attenuata* and *Eucalyptus marginata* subsp. *marginata* over low mkixed shrubs and herbs.

G4a Open Woodland of *Eucalyptus gomphocephala* over Thicket of *Acacia rostellifera* with *Clematic linearifolia* over scattered low shrubs and exotic herbs and grasses.

G5b Open Woodland of *Eucalyptus gomphocephala* over Low Forest or Low Woodland of *Melaleuca rhaphiophylla* and *Acacia rostellifera* over wetland shrubs, herbs and sedges.

LH Heath of mixed shrubs on shallow soils over limestone.

Leda Nature Reserve

G3 Open Woodland of *Eucalyptus gomphocephala, Banksia attenuata* and *Eucalyptus marginata* subsp. *marginata* over low mkixed shrubs and herbs.

G4a Open Woodland of *Eucalyptus gomphocephala* over Thicket of *Acacia rostellifera* with *Clematic linearifolia* over scattered low shrubs and exotic herbs and grasses.

G4b Open Woodland of *Eucalyptus gomphocephala* over Acacia saligna, *Acacia rostellifera* and exotic herbs and grasses in low lying areas.

G5b Open Woodland of *Eucalyptus gomphocephala* over Low Forest or Low Woodland of *Melaleuca rhaphiophylla* and *Acacia rostellifera* over wetland shrubs, herbs and sedges.

LH Heath of mixed shrubs on shallow soils over limestone.

Lowlands Bush Forever Site (Hymus Swamp)

B1 Disturbed Low Open Woodland of *Banksia ilicifolia – Eucalyptus marginata* subsp. *marginata – Allocasuarina fraseriana* over low shrubs and pastoral grasses.

K1 Disturbed Low Shrubland of *Kunzea ericifolia* subsp. *ericifolia* over *Regelia ciliata* over pastoral grasses.

Private Property Remnants

Plant communities on other private property remnants consisted of disturbance communities containing some remnant overstorey species over pastoral grasses and other weed species.

3.2 Vegetation Studies

Woodman Environmental have conducted vegetation condition and weed cover assessments of the easement and adjacent native vegetation along the easement. These studies were designed to provide the following information:

- An indication of the potential for regeneration of the easement following the proposed installation of the lateral.
- The conservation significance of adjacent vegetation.
- Baseline weed data to aid in design of hygiene protocols and weed management measures.

In addition, baseline vegetation monitoring plots were established in native vegetation adjacent to the easement and supplemented with opportunistic recordings to identify species suitable for use in rehabilitation of the easement following installation of the pipeline loop.

Declared Rare Flora (DRF) and Priority flora searching has also been conducted at appropriate times to provide data supporting management of the impacts of the pipeline construction on these species.

3.2.1 Study Method

Flora Species

Flora studies for the DBNGP Looping 10 survey focused on additional searching for the Declared Rare Flora and Priority Flora species known to occur in the vicinity of the corridor. A preliminary review of CALM's GIS database undertaken by Greg Woodman and Mark Garkakalis (Swan Region Regional Ecologist) identified three DRF and three Priority flora species in close proximity to the survey area:

Caladenia huegelii (DRF)
Drakaea elastica (DRF)
Diuris micrantha (DRF)
Dillwynia dillwynioides (P3)
Stylidium longitubum (P3)
Acacia lasiocarpa var *bracteolata* long peduncle variant (P1)

Caladenia huegelii, Diuris micrantha and *Drakaea elastica* are orchids that are only above ground and identifiable for a limited time during the year. *Drakaea elastica* should be searched for at two times during the year, initially in August when its distinctive glossy green leaves appear and are highly visible, then again in October to November when it is in full flower. *Caladenia huegelii* flowers between September to October with the peak survey period coinciding with mid to late September depending on rainfall and temperature. *Diuris micrantha* occurs in winter wet swampy sites and flowers in September to early October. *Dillwynia dillwynioides* flowers from August to December and is quite distinctive and easy to find during spring. *Stylidium longitubum* flowers October to December in seasonal wetlands. *Acacia lasiocarpa* var *bracteolata* long

pedunde variant flowers between May to August. Therefore, field flora surveys were conducted as follows:

1. Brief inspection of significant plant communities during August with searching of appropriate habitat for *Drakaea elastica* and *Acacia lasiocarpa* var *bracteolata* long pedunde variant*;*
2. Grid inspection of appropriate habitat for *Caladenia huegelii* and *Diuris micrantha* during mid to late September with searching of remnant vegetation for other DRF or Priority species; and
3. Grid inspection of appropriate habitat for *Drakaea elastica* and *Stylidium longitubum* in October to confirm presence/absence of these species.

Grid searching included the 30m previously cleared easement with an additional 10m buffer to either side to identify flora at risk from accidental machinery incursion or edge effects of the operations.

Any significant trees within the DBNGP corridor were identified and location recorded.

Weed and Vegetation Condition Mapping

The survey area was inspected for the presence of environmental and Declared weed species, with particular emphasis placed on access routes and areas of previous disturbance and streamzones.

The condition of the vegetation within the study area was mapped using the condition scales given in the Bush Forever documentation (Government of Western Australia 2000). The definitions of the condition ranking is given in Table 1.

Table 1: Vegetation Condition Ranking Scale (from Bush Forever 2000)

Rating	Scale	Description
Pristine	1	Pristine or nearly so, no obvious signs of disturbance
Excellent	2	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species
Very Good	3	Vegetation structure altered, obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing
Good	4	Vegetation structure significantly altered by very obvious signs of multiple disturbance. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing
Degraded	5	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fire, the presence of very aggressive weeds, partial clearing, dieback and grazing
Completely Degraded	6	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs

Rehabilitation Studies

The vegetation mapping conducted previously by Mattiske Consulting was utilised to identify suitable locations for data collection.

Four 10m x 10m plots were established within the Leda Nature Reserve and another four plots were established within the Lowlands Bush Forever site to collect species composition and density data for vegetation in better condition than the remaining sections of the Looping 10 project area. Plots were established in dominant plant communities for each area.

Plot data and opportunistic recording of species were reviewed to identify keystone and dominant understorey species in each area that will be suitable for rehabilitation purposes. Species lists have been developed for seed collection based on the two identified objectives in the different areas of the project.

Within each quadrat, the following data was collected for each plant species:

- Number of plants (except for rhizatomous species)
- Percentage foliage cover

Phytophthora cinnamomi

The survey area was traversed in a vehicle by personnel experienced and accredited for the detection and mapping of *Phytophthora cinnamomi* to CALM standards. High risk plant communities and landscapes were inspected on foot for symptoms of the plant pathogen's presence. Samples of soil and vegetation material from any dead or dying indicator plant species were collected and analysed for the presence of *P. cinnamomi*. Any obvious disease boundaries found were marked in the field using day-glo pink (*P. cinnamomi* infested) or white (uninterpretable) flagging tape.

3.2.2 Study Results

Flora Species

The only DRF or Priority Flora species identified during the survey was *Drakaea elastica*. 17 individuals were identified in 7 (seven) locations within the DBNGP easement between KP 17 and KP 18.5 (Lowlands Bushland, Western Block). Population locations were marked and 5m buffers were created with fence droppers and pink survey tape around the populations.

Two mature flowering plants of *Calochilus* sp. were also located 4 m to the south-west of the existing pipeline in Lowlands Bushland, Western Block. This orchid is rarely seen however it is not a priority species.

Weed and Vegetation Condition Assessment

Appendix A (to be completed) will present the results of the vegetation condition and weed cover assessments. The pipeline AOD has been completely cleared in the past and regeneration of the AOD has been minimal in all sections except the Lowlands Bush Forever Site near Hymus Swamp. Vegetation regeneration at this site has been restricted to dense stands of *Kunzea glabrescens* with occasional shrubs and annual orchid species at ground level. Significant numbers of orchids were observed at this location on the AOD during spring 2005. Vegetation condition rankings for adjacent vegetation ranged from 4/5 within the Leda Nature Reserve and Lowlands Bush Forever Site to 6 in most other areas indicating that remnant vegetation adjacent to the AOD is generally in a poor condition with areas considered to be degraded to a point where recovery to a good condition is considered impossible.

A single Declared plant species (Arum Lily – *Zantedeschia aethiopica*) was recorded from five locations along the AOD. The locations of this species are presented in Table2 of Appendix A. The Arum lily is listed under Section 37 of the *Agriculture and Related Resources Protection Act 1976* as a P1, P4 species within the municipal district of

Serpentine-Jarrahdale. Species categorised as P1 under the *Agriculture and Related Resources Protection Act 1976* have prohibitions on the movement of plants or their seeds within the State. This prohibits the movement of contaminated machinery and produce including livestock and fodder. In addition a category of P4 identifies management tasks including prevention of the spread of infestation from the property on or in livestock, fodder, grain, vehicles and/or machinery and requires treatment to destroy and prevent seed set on all plants.

The highly invasive and competitive species *Watsonia* sp. was also recorded at two locations as presented in Appendix A.

The majority of weed species recorded along the AOD were naturalised species common to developed areas and road verges in the south-west of Western Australia. Several of the grasses are highly invasive and likely to compete with native species in a rehabilitation environment. Weed covers recorded along the AOD were high with many areas having between 65% and 100% cover. Figure 1 presents the weed cover classes along the AOD with locations of *Zantedeschia aethiopica* and *Watsonia* sp. also presented.

Rehabilitation Studies

Appendix B (under development) will present the results of the plot and opportunistic species recordings as described in the method section. The following list of species have been identified for use in seed mixes to rehabilitate the respective portions of the AOD (tree species have been removed to protect the long term integrity of the pipe):

Objective 1: Provide native cover of local dominant understorey species that will stabilise soil and help reduce 3rd party access.

Leda Bush Forever Site & other remnant vegetation on Spearwood Dunes

Acacia pulchella
Acacia rostellifera
Conostylis aculeata subsp. *aculeata*
Dryandra lindleyana
Dryandra sessilis
Hakea lissocarpha
Hardenbergia comptoniana
Jacksonia furcellata
Kennedia coccinea
Kennedia prostrata
Macrozamia riedlei
Melaleuca systena
Xanthorrhoea preissii

Objective 2: Provide native cover of local species that will stabilise soil and help reduce 3rd party access and provide increased understorey biodiversity than is currently present on the easement.

Leda Nature Reserve

Acacia pulchella
Acacia rostellifera
Anigozanthos manglesii
Bossiaea eriocarpa
Calectasia narragarra
Conostylis aculeata subsp. *aculeata*
Daviesia triflora
Dianella revoluta
Dichopogon capillipes
Dryandra lindleyana
Hakea lissocarpha
Hakea prostrata
Hardenbergia comptoniana
Hovea pungens
Jacksonia furcellata
Kennedia coccinea
Kennedia prostrata
Lepidosperma leptostachyum
Macrozamia riedlei
Melaleuca systena
Philotheca spicatus
Phyllanthus calycinus
Scaevola canescens
Stirlingia latifolia
Xanthorrhoea gracilis
Xanthorrhoea preissii

Lowlands Bush Forever site adjacent to Hymus Swamp

Astartea fascicularis
Calothamnus lateralis
Cyathochaeta avenaceae
Gompholobium tomentosum
Hypolaena exsulca
Jacksonia furcellata
Kunzea glabrescens
Kunzea ericifolia
Lepidosperma longitudinale
Regelia ciliata
Scholtzia involucrata
Thysanotus patersonii
Xanthorrhoea brunonis

The remaining small sections originally mapped as remnant vegetation have condition ratings of 5 or 6 and active rehabilitation methods would have little value in these areas.

Phytophthora cinnamomi

The Looping 10 pipeline corridor was assessed for the presence of disease caused by *Phytophthora cinnamomi* in September 2005. The assessment was performed by Mr Evan Brown of Glevan Consulting. Evan is currently accredited by the Department of Conservation and Land Management (CALM) to provide this service.

The entire alignment was inspected for the presence of the disease. At each site where sufficient vegetation free of the disease was detected, this vegetation was demarcated by tying day-glow orange flagging tape across the corridor using a buffer of approximately twenty metres from the active edge of the disease. The knot in the flagging tape always faces the diseased vegetation.

The demarcation lines in the corridor are valid for a period of twelve months. Should any operations be proposed for beyond September 2006, the demarcation lines and any areas now considered to be free of the disease would need to be re-assessed.

Maps showing the dieback boundaries are currently under development. Dieback boundaries will be incorporated into the Environmental Line Lists prior to construction. Dieback lines will also be demarcated along the AOD with relevant hygiene measures implemented at dieback boundaries during the construction operation.

3.3 Other Environmental Values

The pipeline corridor crosses several wetland areas along its length including the Serpentine River. These areas have all been mapped as Conservation Category wetlands. These areas are described as wetlands that possess a high degree of naturalness and should be managed to maintain and enhance natural attributes and functions (Hill *et al*. 1996). Both the Wetlands Conservation Policy for Western Australia (Government of Western Australia 1997) and the Water and Rivers Commission Position Statement: Wetlands (2001) oppose any activities that lead to further loss or degradation of Conservation Category wetlands or their buffers. These wetlands are all listed on the draft Register of Protected Wetlands (Map Sheet 2033) under the *Revised Draft Environmental Protection (Swan Costal Plain Wetlands) Policy 2004*. After KP 11, the majority of the proposed pipeline route traverses Multiple Use wetlands. There are also 6 Resource enhancement wetlands within 250m of the proposed route after KP 11. Between KP 17.0 – 18.6 the route traverses the Conservation category wetland Lowlands Bushland, Western Block. At KP 20.7 the route passes adjacent to a Conservation Category wetland, and at KP 22.4 the route traverses a small Conservation Category Wetland.

4 REHABILITATION STRATEGY

The rehabilitation strategy for the Looping 10 Gas Pipeline Project focusses on the timely reinstatement of areas of clearing on the AOD. Where possible, significant trees on the AOD that do not pose a threat to the integrity of the pipe will be retained and sensitive areas such as the Serpentine River will use HDD to prevent erosion of the riparian zone. The Environmental Management Plan for the project presents management measures designed to minimise impacts of the pipeline construction (Ecos Consulting (Aust) Pty Ltd 2005).

Section 2 identifies the objectives of the rehabilitation program. These objectives aim to provide stable landforms that are vegetated with indigenous species suitable for the areas. They also aim to restrict third party access and provide habitat values to the AOD that will promote flora colonisation and fauna usage.

5 REHABILITATION METHODS

Rehabilitation of the pipeline easement will be integrated with all project activities and objectives. Studies on the easement have demonstrated a restricted ability of the vegetation systems on the easement to recover from disturbance due to weed invasion and third party activities. This data has been utilised to develop the rehabilitation procedures.

5.1 Weed Management

The invasive weed species *Watsonia* sp. and Declared plant *Zantedeschia aethiopica* have been recorded on the easement

The AOD areas currently displaying weed covers in excess of 50% will be selectively sprayed with Glyphosate to reduce weed seed loads in the topsoil in order to improve establishment of native species in the rehabilitation. This will be conducted prior to construction commencing.

Weed covers and species will be included in rehabilitation monitoring to facilitate management of weed issues following completion of the rehabilitation. Annual monitoring results will be used to develop weed management programs in consultation with CALM and ongoing weed control is expected in the early years of rehabilitation to promote native species cover development.

Weed hygiene will be implemented during all operations in accordance with the Weed Hygiene Protocol (Ecos Consulting (Aust) Pty Ltd 2005).

5.2 Dieback (*Phytophthora cinnamomi*) Management

Maps showing dieback boundaries are currently under development from results of the dieback surveys. The maps will be included in the Hygiene Protocol for Looping 10.

Hygiene management will be in accordance with the Hygiene Protocol for the project and will include the following provisions:

1. All vehicles and machinery will arrive at the project area in a clean state free from soil, mud, soil slurry and vegetation material.
2. Soil and vegetation stripped from the AOD will be stored immediately adjacent to the site where it originated.
3. No topsoil or vegetation material will be transported along the corridor.
4. Any material to be imported to the pipeline corridor, eg. Pipe padding, must be certified to be free from *P. cinnamomi* to the satisfaction of CALM.
5. Hydrotest water will be disposed of in a manner acceptable to CALM and in a location that will not compromise the hygiene status of remnant native vegetation.
6. All vehicles and machinery will be cleaned down prior to leaving the project site to prevent the spread of *P. cinnamomi* from the project area to areas of uninfested native vegetation in the region.

Additional management measures will also be developed if survey results necessitate the need to do so.

5.3 Priority and Rare Flora Management

Management of significant species along the AOD will involve a comprehensive approach consisting of the following steps:

1. Surveys for DRF and Priority flora species will be conducted at the appropriate time during Spring 2005 (section 3.2).
2. Locations of all Declared Rare and Priority flora identified on the easement will be mapped and marked in the field.
3. Where practical and in consultation with CALM these plants will be protected from disturbance through the use of fencing and sign-posting on site.
4. Construction personnel will be provided with information on these species and the management practises being implemented at inductions and toolbox meetings.

In the event that DRF or Priority flora cannot be avoided and destruction of some plants is necessary to implement the project, the following management steps will be taken:

1. Plants that are required to be impacted will be individually marked in the field.
2. The impact of removal of the plants on the conservation status of the species will be assessed at a local and regional scale by a qualified botanical consultant in consultation with officers of CALM.
3. Options for transplanting of individual plants or salvage of biological material for later propagation will be discussed with key Government stakeholders.
4. An application to take DRF will be prepared and submitted to CALM for approval by the Minister for the Environment in accordance with the Wildlife Conservation Act 1950.

5.4 Resource Management

Native vegetation on the easement is a valuable resource for the rehabilitation process in that it provides seed, carbon material, stabilises the soil surface, cools the soil surface, provides habitat for fauna and provides micro habitats for capturing additional seed dispersing from adjacent vegetation. In addition, where trees can be retained on the easement they will provide habitat, cover and structure.

Vegetation will be cleared and stored in a windrow adjacent to the AOD immediately adjacent to where it was cleared from. This will ensure that respread vegetation will be located in the appropriate vegetation type and position in the landscape to make best use of any remaining seed stored on the stems.

Topsoil is an essential component of a successful rehabilitation program as it contains the majority of the naturally stored seed for the existing vegetation that propagate using seed as their prime strategy. Topsoil will be removed using a grader that will cut the top 50mm to 100mm of soil and store it in a windrow on the easement edge immediately adjacent to where it was removed from. Similarly to vegetation, this will ensure that topsoil is respread within the appropriate position in the landscape and vegetation type. Topsoil will not be picked up and moved along the easement. Topsoil will not be used for padding in the pipe trench. Topsoil will not be driven on or disturbed in any way prior to being respread on the AOD.

5.5 Soil Profile and Landform

Trench spoil will be removed and stored in a windrow adjacent to the trench. Following installation of the pipe, the trench will be backfilled and compacted. The surface of the AOD will then be graded to original surface contours and lightly ripped to a depth of 40cm to alleviate any compaction from vehicle and machinery movement. Ripping on contour will not be possible due to the constrained width of the AOD, however shallow ripping with narrow tines should not result in the generation of deep furrows and a light drag bar will be utilised behind the machine to smooth the final surface.

Topsoil will be graded evenly back over the AOD following ripping, ensuring that topsoil is not transported along the easement.

5.6 Establishment of Native Vegetation

Native vegetation will be established on the easement utilising the following methods:

1. From the topsoil seedbank (geospores).
2. From plant stored seed (bradyspores).
3. From applied seed.

Points 1 and 2 above have been addressed in the previous section. Studies on the existing easement have shown that the easement has not generally recovered well following installation of the original Dampier to Bunbury pipe and that the easement has a significant weed issue where it traverses native vegetation. In this situation active

rehabilitation in the form of an applied seed mix to increase the establishment of native species is considered necessary.

Species lists have been compiled from the easement studies to generate seed mixes for application to the various sections of the easement. Trees are considered a threat to the integrity of the pipeline and only those understorey species that are known to produce viable seed have been selected for the rehabilitation mix.

The proposed seed mixes for woodland areas are presented in Section 3.2.2. The seed mixes will be applied at a rate of 3kg/ha to promote a high initial establishment rate.

6 COMPLETION CRITERIA

Table 2 presents the completion criteria for the entire Looping 10 Pipeline Project AoD including the rehabilitation specific criteria. Specific vegetation and weed criteria relate to the various sections of native vegetation of the AOD.

Table 2: Completion Criteria for the Looping 10 Pipeline Project

Aspect	Objective	Criteria	Assessment method
Construction	To ensure that the key commitments that will influence recovery of the pipeline easement are implemented during construction	100% compliance with the weed hygiene protocol.	Audit during the operation
		100% compliance with the dieback hygiene protocol	Audit during the operation
		Vegetation and topsoil is cleared and stored in accordance with the EMP.	Audit during the operation
		Significant plant species are protected in accordance with the plan.	Audit during the operation
Decommissioning	To ensure that all visual disturbances are removed by immediate remedial action to the greatest extent practicable	All equipment, materials and litter are removed from the AOD	Visual inspection of AOD

Aspect	Objective	Criteria	Assessment method
Landform	To reinstate the land to provide suitable conditions for natural recolonisation of native vegetation and support natural surface water movement	Natural contours should be re-instated to pre-disturbance conditions	Visual inspection of AOD
		There should be no active erosion rills in excess of the surrounding land *	GPS record and physical measurement of any points of erosion
Vegetation and Weeds – Leda Nature Reserve and Lowlands Bushland, Western Block (Hymus Swamp) where 3rd party access is restricted.	To facilitate the establishment of indigenous plant species within each vegetation type on the AOD	There should be no bare patches longer than 10m after 12 & 24 months.	Visual assessment, with particular emphasis in erosion prone areas
		The foliage cover of declared and environmental weeds on the AOD should be similar to surrounding undisturbed areas at 12 & 24 months	Assessment by photographic and visual survey
		A minimum of 1 native plant per square metre when averaged over the entire area rehabilitated at 12 months and 2 native plants per square metre when averaged over the entire area rehabilitated at 24 months.	Assessment of a representative number quadrats within each vegetation type

Aspect	Objective	Criteria	Assessment method
		Percentage foliage cover of native species indigenous to each plant community is greater than or equal to 40% of foliage cover in undisturbed areas outside the easement at 24 months (excluding pipeline access track)	Assessment of a representative number quadrats within each vegetation type
		Species richness greater or equal to 50% of richness in undisturbed areas outside the easement at 24 months	Assessment of a representative number quadrats within each vegetation type
Vegetation and Weeds – Leda Bushland and Surrounding Remnant Vegetation (Not including Leda Nature Reserve) where 3rd party access is not restricted.	To facilitate the establishment of indigenous plant species within each vegetation type on the AOD	There should be no bare patches longer than 10m after 12 & 24 months when inconsistent with the original condition.	Visual assessment, with particular emphasis in erosion prone areas
		The foliage cover of declared and environmental weeds on the AOD should be similar to surrounding undisturbed areas at 12 & 24 months	Assessment by photographic and visual survey
		A minimum of 1 native plant per square metre when averaged over the entire area rehabilitated at 24 months.	Assessment of a representative number quadrats within each vegetation type

Aspect	Objective	Criteria	Assessment method
		Percentage foliage cover of native species indigenous to each plant community is greater than or equal to 30% of foliage cover in undisturbed areas outside the easement at 24 months* (excluding pipeline access track)	Assessment of a representative number quadrats within each vegetation type
		Species richness greater or equal to 50% of richness in undisturbed areas outside the easement at 24 months	Assessment of a representative number quadrats within each vegetation type

It is Alinta's preference that CALM witness the seed distribution process during rehabilitation.

If the monitoring occasions note areas that do not meet these criteria then discussions will be held with CALM regarding recommended remedial action. It is expected that failed areas will be actively reinstated with planting of appropriate species in failed areas during autumn 2007 in consultation with an appropriately qualified botanical consultant and CALM. Any areas of high weed cover will be treated with an appropriate program in consultation with CALM.

The monitoring will be based on permanent quadrats established following rehabilitation, in addition to a foot reconnaissance of the entire rehabilitated easement to survey for bare areas and weed infestation.

Monitoring will be conducted annually in spring until the rehabilitated areas have regenerated to a stable condition, to the satisfaction of CALM and DoE.

* While best endeavors will be made to achieve these Completion Criteria there may be some exclusions in the heavily degraded Bush Forever and Leda Reserve sections that are frequented by recreational 4WD and trail bike users where 3rd party access is not restricted. In the event that uncharacteristic seasonal weather conditions prevail, this shall be taken into consideration in relation to the completion criteria. In this event where areas are not meeting success criteria joint site reviews will be undertaken to determine appropriate remedial action, if required, to DoE and CALM requirements

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Appendix A

Vegetation and Condition Assessment Results

Appendix B:

Rehabilitation Study Results