NORTHERN NETWORK ALLIANCE

MANAGEMENT PLAN

Rehabilitation and Revegetation Plan

Document number: NNA001-A-PLN-010

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Date	Reason for Issue	Revision	Originator	Signature	Checked By	Signature	Approved By	Signature
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CONTENTS

1 INTRODUCTION

This Rehabilitation and Revegetation Management Plan is one component of the Construction Environmental Management Plan (CEMP) which provides a system and procedures to ensure that Northern Network Alliance (NNA) establishes and maintains best practice controls to manage potential environmental impacts during the construction of the Northern Pipeline Interconnector and associated infrastructure (hereafter referred to as the "Project") and, wherever practicable, realise opportunities for enhanced environmental outcomes.

The NN Alliance consists of the following partners:

- LinkWater
- Abigroup Contractors Pty Ltd
- McConnell Dowell Constructors (Aust) Pty Ltd
- Kellogg Brown & Root Pty Ltd

NN Alliance (referred to as the Alliance) is committed to providing the services it offers in a manner that conforms to the contractual requirements and to all relevant regulatory and legislative requirements. To achieve this, the Alliance will plan, implement and control an integrated management system that achieves the stated environmental outcomes.

The Alliance will ensure that controls are properly implemented and regularly monitored and audited to assess their effectiveness. Changes to the controls will be instigated if they are not achieving their objectives.

1.1 Project Description

NPI Stage 2 forms part of the drought contingency pipeline to connect existing and future water infrastructure on the Sunshine Coast with the Brisbane network. The NPI will be constructed in two stages and will allow the transfer of up to 65 ML/d of potable water between the Sunshine Coast and Brisbane. Stage 1 of the NPI project—between Landers Shute water treatment plant (WTP) and Morayfield—is due for completion by 31 December 2008.

The completed NPI (Stage 1 and Stage 2) will supply a target volume of 65 ML/d of potable fresh water to existing facilities at Caboolture for distribution to localities in the greater Brisbane region. NPI Stage 2 will have the capacity to deliver up to 18 ML/d (under existing utilized entitlements for the Noosa Shire).

Subsequent interconnection of Stages of the NPI may be constructed to link with the proposed Traveston Crossing Dam and/or other bulk water sources proposed for the Sunshine Coast. These subsequent Stages are not considered in this report. However, the use of a large diameter pipe capable of transporting bulk water is a basis for the design of both Stages 1 and 2 of the NPI.

The key components of the NPI Stage 2 project are as follows:

- approximately 48 km of underground pipe between Noosa water treatment plant (WTP) and the termination point of NPI Stage 1 at Eudlo;
- a balance tank with a 5 ML capacity;
- three new pump stations; and
- a new water quality management facility (WQMF) and upgrades to an existing WQMF at Landsborough.

A number of additional above-ground facilities would be required for commissioning, operation and maintenance of the system. These include:

- Water quality maintenance structures
- Water branch mains
- Cleaning and communications stations

1.2 Purpose and Scope

Linkwater is committed to conserving and enhancing the biological environment where possible for the duration of the Project while achieving positive environmental, commercial and social outcomes.

The purpose of this Rehabilitation and Revegetation Plan is to describe the rehabilitation objectives, elements and strategies necessary to address progressive and final rehabilitation within the areas impacted by construction works to ensure that land affected by construction is rehabilitated to at least its original condition.

This Plan has been prepared to address the requirements of the applicable legislation and aims to ensure that the commitments made by the Alliance with regard to rehabilitation are met.

1.3 Objectives and Targets

Objectives:

- Minimise area of overall disturbance
- Undertake a comprehensive revegetation and rehabilitation program of all disturbed areas
- Revegetation and rehabilitation undertaken in a timely manner

Targets:

- No unnecessary clearing during the project
- Reinstatement and rehabilitation to occur within 6 months of commencement of works for each subcatchment
- Successful rehabilitation and enhancement of disturbed areas within the corridor as measured against pre-construction assessment

The above performance criteria have been developed for this MP to assist to deliver desirable outcomes. The performance criteria will be linked to Key Performance Indicators (KPIs) for the Project.

Once the pipeline is operational, the pipeline itself will be underground. As a result, private land owners will be able to resume previous activities on top of the pipeline, provided that the use does not include excavation or ripping activities. An important part of the construction activity identified is the final rehabilitation stage, which will be undertaken with best practice pipeline construction to rehabilitate the land to the pre-construction environment.

2 LEGISLATION AND REGULATORY REQUIREMENTS

2.1 Licences/ Permits

There are no licences and approvals required for the rehabilitation of the pipeline route. Any applicable licences and permits will be sought throughout the construction period (e.g. vegetation clearing permits) and will be contained within the relevant Environmental Management Plans.

2.2 Guidelines/References

Appropriate guidelines will be used as required. A few examples of relevant guidelines include the following:

- Riparian Land Management Technical Guidelines. 1999. Lovett, S & Price P (eds).
- A Rehabilitation Manual for Australian Streams. 2000. Rutherford, I., Jerie, K. & Marsh, N.
- Guidelines for Protecting Australian Waterways. 2002. J Bennett.
- Principles of Riparian lands Management. 2007. Lovett, S & Price P.
- Code of Environmental Practice – Onshore Pipelines, 2005, Australian Pipeline Industry Association.
- IEAUST's Soil Erosion and Sediment Control, 1996, Engineering Guidelines for Queensland Construction Sites.

2.3 Commitments

The *Environmental Impact Statement* for the proposed NPI Stage 2 has several commitments for the management of Rehabilitation. Table 1 identifies examples of these key commitments.

Table 1. Rehabilitation commitments (refer NNA EIS 2008, Appendix E for final commitments)

Document	Section	Requirement/Commitment
	3.1	Construction will not result in significant long-term erosion and sedimentation impacts.
	3.2	All cleared sites will be reinstated with appropriate species following construction.
	3.2	Banks and landforms will be reinstated as near as practicable to their original profile.
	3.3	Topsoil will be removed and stockpiled separately for reuse during reinstatement.
	3.3	Construction in or adjacent to endangered ecological communities or threatened species habitats will be managed through specific mitigation plans.
	3.3	Monitoring of the recovery of impacted ecosystems and/or significant species will be implemented and updated as necessary.

3 EXISTING ENVIRONMENT

3.1 Surrounding Land Uses

Approximately two thirds of the preferred corridor makes use of an existing cleared easement maintained by Energex, or previously established by the now-defunct Gympie to Gatton gas pipeline. The existing easement is largely unrestricted by urban or residential development.

Land uses are typically limited to low-density rural residential properties. Land within the valleys has been highly modified and are typically characterised by more intensive uses, including cropping, road and rail infrastructure, urban communities, industrial uses and rural residential properties.

Further desktop studies, investigation/surveys may be undertaken prior to construction, as required to satisfy this MP.

3.2 Landforms and Soils

The Stage 2 project area takes in the eastern edge of the Blackall Range, traversing a number of ridges which extend west-east towards the coast. The main line extends in a north-south direction, commencing in the rolling hills around Lake Macdonald and descending onto the floodplain of the North Maroochy River. To the west of Eumundi, the route crosses a steep ridge adjacent to the Bruce Highway, and traverses the western edge of Yandina township onto the South Maroochy river floodplain. South of Yandina, the route crosses two high coastal ridges and the middle reaches of Petrie and Paynter creeks. The corridor rises again before descending onto the flats around Eudlo Creek and ascending steeply to connect with the Stage 1 works at Nobels Road.

The alignment from Landers Shute heading north to the Noosa WTP traverses the six main soil types. These soils of the alignment have been formed from the underlying geological parent materials:

- Alluvial soils within the flood plains of the main watercourses are variable in depth, texture, fertility and drainage characteristics.
- Gravelly loams can be prevalent in the narrow flood plains adjacent to lower order streams in the upper catchment areas while deep uniform textured or gradational clays (including black earths and prairie soils) are common in the broad flood plains of the major streams. Most alluvial soils are relatively resistant to erosion, due primarily to the low gradient position in the landscape, but may be prone to stream bank erosion.
- Gleyed podzolic and humic gleys (poorly drained acid soils) are found in some of the lower terraces of the alluvium. However, drainage works undertaken in the past—mainly as part of development for sugar cane production—may have improved the profile drainage characteristics
- Red and yellow podzolic soils are texture contrast soils generally associated with Landsborough Sandstone parent material. The soils have a sandy or loam surface horizon with a clay subsoil and there may be a significant gravel component in the subsoil. These soils

are highly susceptible to erosion, particularly where slopes exceed 8%. Red and yellow earths are uniform textured soils also associated with Landsborough Sandstone parent material. While still erosion-prone, they are generally less susceptible than red and yellow podzolic soils.

- Krasnozems are deep uniform or gradational soils which, within the project area, are confined mainly to the land around Eumundi and North Arm. These soils are relatively resistant to erosion and are used for growing ginger.
- Lithosols (mainly shallow gravelly soils with minimal profile development) are common in steeper sections of the project area where grades exceed 10%. They are highly susceptible to erosion although the severity of this risk may be mitigated by the significant stone component within the soil matrix.

3.3 Drainage and Waterways

The project area encompasses the catchment areas of the Maroochy River, also extending into a small area of the Mary River catchment. Within these two catchments, the proposed corridor traverses four principal waterway systems; South Maroochy River; North Maroochy River; Six Mile Creek; and Petrie Creek.

3.4 Vegetation

The project area has been surveyed by a botanist (Mike Olsen) and, apart from that mentioned below, no significant species have been recorded within the corridor. Mr Olsen's full report can be found as an Appendix in the EIS.

Much of the preferred corridor is characterised by heavily disturbed urban and agricultural environments and public utility easements which have been cleared of natural vegetation. However, intact stands of vegetation do persist within and adjacent to the corridor along waterways, ridges and steep slopes traversed by the pipeline. The areas of remnant vegetation can be broadly grouped into the following types:

- intact gallery rainforest (RE 12.3.1), sometimes with eucalypt emergents (RE 12.3.2), along waterways
- patches of lowland gallery rainforest of reasonable size which are now rare within south-east Queensland
- large tracts of tall open eucalypt forests along coastal ridges, often contained within national parks and forest reserves
- small areas of *Melaleuca* wetland in riparian depressions around Eudlo Creek.

3.5 Sensitive Environmental Areas

A number of sensitive environmental areas were identified along the proposed pipeline corridor. Table 3 below lists those anticipated items/areas identified as sensitive.

Table 2. Key sensitive environmental areas on the NPI Stage 2 route

Location	Environmental constraints and significant species
Nobels Road site	State wildlife corridor; potential habitat for Large-eared Pied Bat, Marbled Frogmouth, rare raptors and other species
Slope and gully south of Winston Rd South, Woombye	Local east-west wildlife corridor; potential habitat for Tusked Frog and Wallum Froglet and Koala.
Drainage line North of Winston Rd, Woombye	Mapped endangered RE type; Tusked Frog present and potential habitat for Elf Skink.
Gully south of Nambour Connection Rd	Local east-west wildlife corridor; Tusked Frog present and potential habitat for Koala & Lewin's Rail.
Paynter Ck – Crossing 1 & 2	Potential habitat for Giant Barred Frog and local east-west wildlife corridor.
Paynter Ck – Crossing 3	Tusked Frog present and potential habitat for Giant Barred Frog and Elf Skink.
Petrie Creek Crossing	Elf Skink present and potential habitat for Giant Barred Frog and Tusked Frog.
Tuckers Creek crossing behind Maroochy Shire Council Depot, Nambour	Potential habitat for Giant Barred Frog, Tusked Frog and Elf Skink.
Vegetation north of, and running parallel to Tuckers Creek, Nambour	Mapped endangered RE type; potential habitat for Tusked Frog and Elf Skink.
Dams either side of easement at the end of Tuckers creek Road, Nambour	Potential habitat for Tusked Frog and Elf Skink.
Significant 12.3.2 vegetation along Tuckers Creek to the immediate west of the existing easement	Potential habitat for Elf Skink and *O. truncates*.
Duhls Road crossing north to tributary of Tuckers Creek	Potential habitat for Koala, Tusked Frog and Elf Skink.
Caboolture Creek and vegetation to the north	Tusked Frog present and potential habitat for Koala.
Open forest woodland adjacent to Mt Crombe Road	Potential habitat for Tusked frog and Koala.
Woodland and riparian vegetation adjacent to Creighton's Road	Potential habitat for Tusked frog and Koala.
South Maroochy River (incl Mount Coombe Creek)	Degraded endangered vegetation type; potential habitat for Giant Barred Frog, Tusked Frog, Elf Skink, Platypus and Koala
Browns Creek at Lees Rd (93.5 km)	Mapped endangered RE type
Running Creek (94.5 km)	Mapped endangered RE type
Balsam Road (99 km)	Large habitat trees on east side
Sandy Creek (101.1 km)	Known habitat for Tusked Frog; potential for Giant Barred Frog
North of Neeraway Road (103.9 km)	Potential habitat for Giant Barred Frog and Tusked Frog
Gully at Holts Road (105 km)	Regional wildlife corridor; potential habitat for Elf Skink
Unnamed waterways (107.2 km)	Mapped endangered RE type; regional wildlife corridor; potential for Tusked Frog and Koala

Location	Environmental constraints and significant species
Drainage reserve (109.5 km)	Mapped endangered RE type; *Xanthostemon oppositifolius* and *Symplocos harroldii*
Pearsons Road	Mapped endangered RE type; *Xanthostemon oppositifolius* and *Symplocos harroldii*
Six Mile Creek (Left branch) close to Lamonts Road	Mapped endangered RE type; Potential for *Xanthostemon oppositifolius*, *Symplocos harroldii,* Mary River Turtle, Oxleyan Pygmy Perch and Tusked Frog.
Six Mile Creek (Left branch) and Anabranch confluence	*Xanthostemon oppositifolius* and Tusked Frog present. Potential for Mary River Turtle, Mary River Cod, Oxleyan Pygmy Perch and *Symplocos harroldii*

"likely" confirms the use of habitat assessment as a basis, as there has been limited time for long term monitoring.

3.6 Weeds

A weed survey will be undertaken along the proposed pipeline corridor. A survey along the NPI Stage 1 corridor identified a number of key declared and non-declared weed species present along the proposed pipeline corridor. It is anticipated that these species will also be found along NPI Stage 2 (refer Table 4).

Table 4 Weed species with potential to occur within the study area

Common Name	Scientific Name	Declared Plant Class
Agave	Agavaceae spp	N.D
African Tulip	*Spathodea campanulate*	Class 3
Balloon Cotton	*Gomphocarpus physocarpus*	N.D
Balloon Vine	*Cardiospermum grandiflorum*	Class 3
Broadleaf Pepper Tree	*Shinus terebinthifolius*	Class 3
Broadleaf Privet	*Shinus terebinthifolius*	Class 3
Cadaghi	*Corymbia torelliana*	N.D
Camphor Laurel	*Cinnamomum camphora*	Class 3
Castor Oil Plant	*Ricinus communis*	N.D
Chinese Elm	*Celtis sinensis*	Class 3
Cocos Palm	*Syagrus romanzoffianum*	N.D
Creeping Lantana	*Lantana montevidensis*	Class 3

Common Name	Scientific Name	Declared Plant Class
Easter Cassia	*Senna pendula var glabrata*	N.D
Fire Weed	*Senecio madagascariens is*	Class 2
Giant Rats Tail Grass	*Sporobolus pyramidalis /natalensis*	Class 2
Glycine	*Neontonia wightii*	N.D
Groundsel Bush	*Baccharis halimifolia*	Class 2
Guava		N.D
Inkweed	*Phytolacca octandra*	N.D
Japenese Sunflower	*Tithonia diversifolia*	N.D.
Lantana	*Lantana camara*	Class 3
Leuceana	*Leucaena leucocephela*	N.D
Mother of Millions	*Bryophyllum delagonsis*	Class 2
Ochna	*Ochna serrulata*	N.D
Pond Apple	*Annona glabra*	Class 2
Prickly Acacia	*Acacia farneceana*	Class 2
Salvinia	*Salvinia molesta*	Class 2
Singapore Daisy	*Sphagneticola trilobata*	Class 3
Sirato	*Macroptillium atropurpureum*	N.D
Small Leaf Privet	Ligustrum sinense	Class 3
Wild tobacco	Solanum mauritianum	N.D
Weeping Willow	*Salix spp.*	Class 1
Whisky Grass	*Andropogon virginicus*	N.D.
Yellow Bells	*Tecoma stans*	Class 3

4 REHABILITATION ELEMENTS

This Rehabilitation and Revegetation MP specifies the actions and strategies to achieve the following:

- topsoil cover to be re-established and all land and waterways disturbed by the Project are returned to a stable condition as soon as practicable after construction
- land to be returned as close as possible to its previous level of productivity
- stable landforms are re-established to original topographic contours
- natural drainage patterns are reinstated
- erosion control measures to be installed in erosion prone areas
- the pre-construction environment and disturbed habitats are to be rehabilitated

Based on the above specification, the following elements are further considered.

4.1 Topsoil and Disturbed Areas

Areas that will be disturbed during construction include:

- right of way (ROW)
- compound sites including areas adjacent to waterway crossings, access roads, laydown areas and office sites

The ROW will be levelled to the required gradient using graders, excavators and bulldozers. Topsoil will be removed where required and stockpiled separately from any subsoil materials and not mixed, prior to reuse during rehabilitation. Controls on the reuse of topsoil in weed infested areas are important so as to avoid spreading weeds.

Typical requirements during the final stages of rehabilitation include:

- During rehabilitation of the ROW, the materials will be replaced in the order in which they were removed.
- Prior to topsoiling activities, all compacted areas will be ripped.
- Post construction semi-permanent cross berms may be required on steep slopes or adjacent to waterways until revegetation has taken hold, in order to remove any storm flows off the ROW
- Other means of stabilisation i.e. rock/jute matting etc.

In addition, the excavation for the pipeline will result in some excess spoil after backfilling. It is considered that this material should be reused where possible during site rehabilitation and levelling.

There are several areas adjacent to waterways which will be disturbed as a result of construction activities. Returning these disturbed areas to a stable condition following construction will need to occur as soon as practicable.

4.2 Topography and Landforms

Prior to the commencement of construction the entire pipeline alignment will be surveyed (including cross sections) to record pre-existing surface levels.

Once the pipeline is operational, the pipeline itself will be underground and therefore pre-existing surface levels will be reinstated.

4.3 Drainage

As stated in Section 0 above, the current drainage which exists along the pipeline route is unlikely to be impacted by the construction activities and will be fully re-instated where altered.

Temporary drainage systems will be used throughout the construction period, especially drainage berms to take any stormwater off the cleared ROW. Permanent drainage berms may be constructed to reduce the risk of future erosion along the corridor.

Techniques for restoration of above and below ground water movement will be addressed in progressive erosion and sedimentation controls to be developed for all areas of the Project. The Soil and Water MP (NNA001-A-PLN-011) addresses erosion and sediment control and will be consistent with the Maroochy Manual for Erosion and Sediment Control, 2007 and where necessary, the IEAUST's Soil Erosion and Sediment Control, Engineering Guidelines for Queensland Construction Sites 1996.

4.4 Revegetation

Where clearing of vegetation cannot be avoided, the Alliance is committed to revegetating areas following construction as soon as practicable. Varying degrees of site remediation will be required for different classifications of vegetation and these are reflected in the work methods outlined below.

Restorative planting of vegetation will occur progressively during construction to maintain and establish wildlife corridors and to ensure disturbance is limited to the shortest possible time frame.

When revegetating, the following measures should be followed:

- species selection and densities should be appropriate for the habitat being revegetated
- native species, preferably those endemic to the area, should be used
- fence off turfed areas to prevent access until the site is fully established
- ensure the necessary maintenance is provided (e.g. watering, fertilising, weeding) until the plants are self-maintaining

Proposed revegetation procedures, including seed mixes, rates and application techniques, along with procedures for establishing vegetation, including seed source, stock type and planting densities must be determined for each site. These will be developed with the Project Ecologist/Botanist to identify

significant flora and fauna, oversee translocation activities (if required) and advise on habitat restoration (site rehabilitation).

Revegetation work should be periodically assessed (weekly until plants are established and then three-monthly) to determine if vegetation is re-establishing or if remedial action is required.

Weed management will be a key component in ensuring the success of all rehabilitated areas and is dealt with comprehensively in the Weed and Disease MP (NNA001-A-PLN-016).

4.4.1 Full Reinstatement

Full reinstatement is to be undertaken where vegetation clearance has occurred in areas of high conservation value vegetation, primarily in 'endangered' regional ecosystems and identified habitat areas for threatened species. This includes Riparian Areas and Waterways

These areas are recognised as having high conservation value for ecological communities or species and, as such, reinstatement will aim to replicate the original structure and species diversity of the affected area.

In most instances, this technique will be used where construction has occurred in a constrained corridor. Revegetation efforts will comply with the following:

- Pre-construction documentation of composition and condition of vegetation to be cleared through the development of Sensitive Area Plans (SAPs)
- Relocation of and/or collection of seed from any significant species at the site
- Early propagation of seeds or plant material for significant species
- Where landowner is in agreement, mulching of all native vegetation cleared from the site and stockpiling during construction
- Where required, mulch will be re-spread once trenching and topsoiling is completed
- Species distribution and densities to reflect original vegetation condition as documented in SAPs
- Prioritise the planting of fast-growing, colonising shrubs and groundcovers to minimise opportunities for weed invasion. Where species are easily propagated and are known to survive open planting in disturbed sites, as full a range of species recorded at the site, including canopy species, should be planted.
- No large trees are to be grown within 7.5m of the pipe centreline, only shrubs and low herbaceous species. Allowance has also to be made for a permanent vehicle access along the ROW. Re-planting must also be in accordance with the Energex Electricity regulations.
- Revegetation to be achieved through a combination of direct seeding techniques and planting of tubestock if necessary
- Weed mitigation and monitoring
- Ongoing monitoring in accordance with approved monitoring program

4.4.2 Partial Reinstatement

Partial reinstatement will be used for other areas of remnant vegetation designated under the *Vegetation Management Act 1999* as 'of concern' or 'not of concern'. In these areas partial reinstatement will focus on the alleviation of impacts associated with fragmentation and will assist the natural regeneration of cleared areas. Reinstatement of these areas will be similar to the Full Reinstatement options except less tube stock will be planted. It will comply with the following:

- Pre-construction documentation of composition and condition of vegetation to be cleared
- Mulching of all native vegetation cleared from the site and stockpiling during construction
- Mixing mulch with topsoil and respreading across the site once trenching is complete
- Prioritise the planting of fast-growing, colonising shrubs and groundcovers to minimise opportunities for weed invasion. Where species are easily propagated and are known to survive open planting in disturbed sites, as full a range of species recorded at the site should be planted.
- No large trees are to be grown within 7.5m of the pipe centreline, only shrubs and low herbaceous species. Allowance has also to be made for a permanent vehicle access along the ROW
- Revegetation to be achieved largely through direct seeding techniques but augmented with planting of tubestock where available
- Weed mitigation and monitoring
- Ongoing monitoring in accordance with approved monitoring program

4.4.3 Native Roadside Vegetation

Native vegetation often survives in expansive road verges due to minimal interference from human activity and may become valuable as a link between habitat areas or in supporting significant species. This level of revegetation should be undertaken in areas where native vegetation and individual trees are removed for construction of the pipeline.

- mulching of any cleared vegetation for respreading on site at the completion of trenching
- use of direct seeding techniques as appropriate
- replanting of the cleared area with tubestock of the same or similar species to that removed (unless identified as a weed species or species introduced from non-local sources)
- weed management, as appropriate (refer to the Weed and Disease Management Plan)
- ongoing monitoring in accordance with approved monitoring program.

4.4.4 Existing Landscaped Areas

This level of reinstatement will be applied to smaller landscaped areas, for example in public parks or private gardens. For these areas, reinstatement / re-landscaping will focus on appropriate landscaping

with native or exotic species, as appropriate, to restore visual amenity rather than ecological function. The following should be implemented:

- mulching of any cleared vegetation for respreading on site at the completion of trenching or the use of commercial mulch as appropriate
- replanting of the cleared area with available tubestock
- species selection should reflect the original character of vegetation cleared from the site and be appropriate for highly modified or urban environments
- weed management, as appropriate

4.4.5 Open Areas and Farmland Pasture (parkland, gardens, drainage lines)

This level of rehabilitation will be undertaken where pipeline construction is completed in a cleared corridor or easement. For these areas, normal agricultural seeding, hydro-seeding or basic hydro-mulching techniques will be applied to return the pre-existing ground cover or an appropriate or preferred replacement to the site. Some areas may need to be turfed. For hydro-mulching, mulch material can be combined with an appropriate seed mix to achieve this result. Appropriate weed control measures will also be implemented. Most drainage lines will require rock rip rap to prevent scouring.

4.5 Habitat Rehabilitation

Habitat rehabilitation will consider development of the following habitat features:

- hollows / nesting boxes appropriate for key species through the district (wherever possible sourced from existing vegetation that has been felled during vegetation clearing for the Project, however, this may be supplemented with purposed built nesting boxes)
- bee hives for native bees dependent on the existing distribution and abundance
- feed trees for key species and migratory birds, these may include items such as fig trees within locations that would typically have been within the pre-clearing landscape

4.6 Weeds

Weed removal should occur before rehabilitation and replanting, and continue until rehabilitated areas are established (refer to Weed and Disease Management Plan).

4.7 Sensitive Areas

A Special Area Plan will be prepared for identified sensitive areas within the corridor impacted during construction. These site-specific plans will be developed with consideration to the elements listed herein.

Additional sensitive areas may be determined as detailed botanical surveys are completed prior to construction. More detailed mapping is being prepared that will indicate the key environmental values at these locations.

4.8 Constraints

Rehabilitation of the pipeline alignment will vary from area to area depending on the level of clearing, the habitats within each area as well as the ongoing operation and maintenance requirements. In addition, there are several constraints that will need to be addressed in each of the areas. These constraints are outlined below (refer Table 6).

Table 6 Summary of constraints to rehabilitation

Constraint	Description
Weather	The rehabilitation strategy will require revision during periods of extreme weather. For example, should the current drought period extend until rehabilitation activities commence, the strategy will be revised to ensure effective and water-efficient measures are implemented.
Off-set Distances from Pipeline	The Operator of the pipeline will need to ensure that the structural integrity of the pipeline is maintained. In this regard, planting in close proximity to the pipeline must consider the root system of the chosen plant species. While deep-rooted vegetation cannot be re-established directly across the pipeline (due to potential damage to the corrosion protection systems), shallow root cropping and grassland re-establishment is encouraged.
Transmission Lines	The pipeline alignment has been determined where possible based on existing infrastructure. In this regard the level of clearing and general disturbance is minimised. In several areas the pipeline route will coexist with existing Energex infrastructure. Rehabilitation in these areas will need to be in accordance with the Energex requirements for operations and maintenance.
Land Owner Negotiations/ Requirements.	Interference to landholder activities will vary according to the level of impact caused by the construction of the pipeline. Every effort will be made to minimise this impact and each landholder will be consulted to discuss their specific requirements regarding the Project. The trench will be left open for the minimum amount of time practicable, and should not pose a long-term hazard or barrier to stock or wildlife. Temporary provisions, such as fencing, driveways or stock access to water, will be discussed with each landholder. Reinstatement works will be discussed and agreed with land owners and it is the intention of SRWP Co to rehabilitate areas to at least the original condition.
Fencing/ Property Boundaries	As above.
Weed Infestation Areas	In areas which are infested with weeds the level of rehabilitation will be assessed in site-specific rehabilitation plans to ensure no spread of infestation.
Road Safety	Planting of trees and shrubs will need to consider any impact to line of sight for drivers/the Operator. This is of specific importance along the road verge where motorist's line of sight cannot be compromised. Consideration of low-growing species or grasses is considered acceptable in these locations. Specific requirements will be developed in consultation with the relevant Council.
Maintenance Tracks	An access track will be required along the pipeline route within the ROW for ongoing operations and maintenance. Some additional works may be required to access into this area- these will be determined as construction works progress. The location and rehabilitation of the access tracks will be conducted in consultation with the landholder.

5 REHABILITATION STRATEGY

Based on the rehabilitation elements outlined in Section 4 above, this section outlines the strategy to be implemented throughout the works. Rehabilitation will be progressive and must take account of:

- any special circumstances of the land
- the surrounding environment
- the need to stabilise the land
- the desirability or otherwise of returning agricultural land to a state that is as close as reasonably possible to its state before

Successful rehabilitation will be as measured against pre-construction assessment.

5.1 General Rehabilitation Strategies

Rehabilitation strategies are described in Table 7 below.

Table 7 Rehabilitation strategies

Work Phase	Activity to be undertaken	Responsibility
Pre-Construction	Photographic survey of alignment for all elements identified above i.e.: • topsoil and landforms • drainage • vegetation • Environmentally Sensitive Areas	Environmental Manager
	Survey of alignment including cross sections to record existing surface level and contours. This survey should include the locations of rivers and creeks.	Surveyors
	Undertake relevant flora and fauna surveys including (but not limited to): • Special Area Mapping • Endangered RE's and critical fauna habitat are documented • translocation of rare and threatened species where applicable • weed and disease mapping	Environmental Manager
	Development of Work Method Statements (WMSs) to ensure that appropriate mitigation measures will be deployed throughout the construction activities. The WMSs are integrated and as such consider OHS, quality assurance and environmental requirements.	Area Managers/ Environmental Manager
	Correct implementation of the verification procedure will ensure important environmental issues and sites are tagged prior to works commencing in an area.	Area Manager/ Environmental Officer
During Construction	Ensure that clearing is minimised where possible and works are confined to approved corridor (constrained and unconstrained areas).	Site Supervisor/ Environmental Officer

Work Phase	Activity to be undertaken	Responsibility
	Stockpiling of topsoil for reuse during rehabilitation works. Ensure that stockpiles are separated from subsoils and covered as appropriate, or that appropriate erosion and sediment controls are in place to avoid erosion and sediment runoff.	Site Supervisor/ Environmental Officer
	Undertake weekly inspections and complete weekly inspection checklist to ensure that areas of disturbance are being minimised and that effective controls are being implemented to minimise environmental impact.	Environment Officers
	Development of Special Area plans in consultation with Councils, landowners, EPA as necessary	Environmental Manager / Corridor Team
	Progressive rehabilitation to be undertaken in accordance with this Rehabilitation Plan.	Site Supervisor/ Environment Officers
Post Construction	Vehicles will be confined to designated maintenance access tracks within ROW.	Operator
	Undertake monitoring and maintenance as required on rehabilitated areas to ensure long term stabilisation	Operator
	Implement corrective actions where necessary if performance objective is not being achieved. This will include replanting of species which have not survived, installation of additional controls if erosion is occurring etc.	Operator

5.2 Site Specific Special Area Plans

Extensive clearing has occurred across the Energex easements and environments have been greatly modified as a result of previous land use. The Special Areas will also require provisions to ensure the areas are rehabilitated to at least it their pre-existing condition.

Site-specific Special Area Plans will be developed to address all the elements listed in Section 4 above including:

- topsoil and disturbed areas
- topography and landforms
- drainage
- erosion and sediment controls
- revegetation
- weeds
- constraints, including potential need for fire breaks where large tracts of land are being rehabilitated

6 CORRECTIVE AND PREVENTATIVE ACTIONS

6.1 Community liaison and complaint management

Complaints represent an opportunity to enhance project environmental performance. All project complaints, including those from members of the public, stakeholder groups and Government agencies, will be managed via the NNA 1800 243 998 phone number to be listed in the Inquiry and Complaints Management Procedure, contained in the Community and Stakeholder Management Plan.

Complaints from any source must be registered using the QESE complaint record section. Where the complaint is environment-related, the complaint will be investigated by the Environmental Manager or Environmental Officer in consultation with the Site Manager or delegate and action/s taken to enable satisfactory closure.

Feedback to relevant personnel will be managed by the community relations team. As required, complaint details (including type and preventative/corrective actions) will be advised to field staff via pre-start meetings, toolbox talks or the Health, Safety and Environment Committee as appropriate.

6.2 Environmental incident/emergency reporting

All project staff and subcontractor personnel shall report all environmental incidents to the Environmental Manager, although initial response may go via the Site Manager/Spread Supervisor or Environmental Officer.

6.3 Incident/emergency preparedness and response

An Incident Response Plan will be prepared for the project. This plan documents suitable incident procedures to ensure effective response in the event of an emergency (including environmental emergencies such as fire, flood and large fuel spills).

The emergency procedures shall be tested on a six-monthly basis. Records are to be maintained of all site emergencies and results of emergency practice drills. The Emergency Response Controller for the project will be defined within the Incident Response Plan.

The key to effective prevention of incidents is monitoring, surveillance and training. During construction activities, inspections and preventative action to be performed by the Alliance will include:

- daily inspections of active worksites and completion of routine environmental checklists
- issue and quick close-out of NCR/EIN
- maintenance of constant supervision on site
- ongoing environmental training
- environmental audits of worksites, subcontractors and compliance issues.

Environmental and safety information on hazardous substances (e.g. Material Safety Data Sheets [MSDS]) will be available at the main site office, including information on where and how such substances are to be stored. An up-to-date list of emergency response personnel and organisations will be maintained at the main office and compounds. A list of key environmental personnel will also be included with contact details.

Specific measures will also be implemented to minimise the risk of an incident occurring due to spillage, storage of hazardous materials or fire. Further information will be detailed in the Incident Response Plan.

6.4 Incident investigation

All incidents will be documented, investigations conducted and action plans (if required) developed to ensure no repetition of the event. Where current procedures are identified as being ineffective, the CEMP and any relevant WMS will be revised by the Environmental Manager and/or Health and Safety Manager.

An environmental investigation includes the following basic elements:

- advising the environmental authority(ies) if any substantial pollution has occurred
- identifying the cause and extent of and responsibility for the incident
- identifying and implementing the necessary corrective action
- identifying the personnel responsible for carrying out the corrective action
- implementing or modifying controls necessary to avoid a repeat occurrence of the incident
- recording any changes required to written procedures.

All personnel are required to report all incidents, as incident reporting is regarded as a valuable method of addressing shortcomings in procedures, training or equipment, and is an opportunity for improvement. It is also an offence not to report to the EPA any incident causing serious environmental harm.

6.5 Non-conformances

Non-conformances will be resolved according to the Quality Management Plan. The Environmental Manager or delegate will issue a Non-conformance Report (NCR) or an Environmental Improvement Notice (EIN) in response to inappropriate or non-conforming work methods, equipment selection, maintenance of controls or other identified concern.

In the event of a non-conformance:

- the nature of the event will be investigated by the Environmental Manager
- advice may be sought from a specialist
- monitoring may be undertaken
- the effectiveness or need for new/additional controls will be reviewed
- an appropriate preventative and corrective action will be implemented
- strategies will be identified to prevent reoccurrence
- the NCR will be closed-out
- environmental documentation/WMS will be reviewed and revised
- will be documented on QESE,

7 INSPECTION AND MONITORING

7.1 Inspection

Weekly inspections will be undertaken throughout the construction period by the Site Environment Officers, the Site Superintendents and Project Engineers. This inspection will ensure that appropriate controls are being implemented and are effective. It will also ensure that where necessary additional monitoring is undertaken as a result of changes to activities/construction methods. Any issues identified during the weekly inspections will be recorded in the Weekly Environment Inspection Checklist (G-FRM-001).

7.2 Monitoring

Monitoring of rehabilitation will determine whether rehabilitation objectives and requirements are being achieved. In particular, review of achievement of “performance criteria" should be monitored during and following rehabilitation.

7.3 Operation and Maintenance

Maintenance of rehabilitated sites is often the difference between the ultimate success or failure of rehabilitation. Both during and following rehabilitation works, routine maintenance of erosion and sediment controls should be undertaken. Maintenance of revegetation may also be required, in the form of replanting or reseeding in failed areas, weed control, watering, pest control and installation/repair of tree guards and fencing for protection from grazing.

An Operations EMP will be prepared for the construction phase. This EMP will specify in more detail the arrangements for ongoing monitoring of the easement.

8 DEFINITIONS AND ACRONYMS

Acronym	Glossary
CAR	Corrective Action Requests
DEH	Commonwealth Department of Environment and Heritage
EIN	Environmental Infringement Notice
DoIP	Department of Infrastructure and Planning
EIS	Environmental Impact Statement (Draft) as prepared by SRWP Co. April 2006
EMP	Construction Environmental Management Plan
EPA	Queensland Government Environment Protection Agency
FMP	Fauna Management Plan
IEAUST	Institution of Engineers Australia
KPI	Key Performance Indicators
Linkwater	SRWPCo now trades as Linkwater, which is 100 per cent owned by the Queensland Government
NCR	Non-Conformance Report
NNA	Northern Network Alliance
NPI	Northern Pipeline Interconnector
OHS	Occupational Health and Safety
RE	Regional Ecosystem
ROW	Right of way
RP	Rehabilitation Plan
QESE	Quality Environmental Safety Engineering Database
SAP's	Special Area Plan's
SEIS	Supplementary Environmental Impact Statement
Sensitive receivers	Inhabitants or occupants of residential or institutional land uses (e.g. health care and educational facilities)
SRWP Co.	Southern Regional Water Pipeline Company
SWMP	Soil and Water Management Plan
VMP	Vegetation Management Plan
WMP	Waste Management Plan
WMS	Work Method Statement

9 REFERENCE DOCUMENTS

IEAUST (1996) Soil Erosion and Sediment Control, Engineering Guidelines for Queensland Construction Sites – *Institution of Engineers Australia* [*IEAUST*, now Engineers Australia], Queensland.

NNA 2008, NNA Draft Environmental Impact Statement (EIS), Northern Network Alliance, Queensland

SRWPA (2006a) *Northern Pipeline Interconnector Project Draft Environmental Impact Statement* (EIS), Southern Regional Water Pipeline Alliance, Queensland.

Vegetation Management Act 1999