



NewGen Neerabup Gas Pipeline

Rehabilitation Management Plan

Prepared for
NewGen Neerabup Partnership
by Strategen

October 2014



STRATEGEN
environmental consultants

NewGen Neerabup Gas Pipeline

Rehabilitation Management Plan

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October 2014

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Client: NewGen Neerabup Partnership

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1. Introduction

This Rehabilitation Management Plan outlines the approaches to be implemented within areas of disturbance resulting from the construction of the NewGen Neerabup gas pipeline, power station and transmission line. The rehabilitation works are to be undertaken in accordance with this plan.

1.1 Background

NewGen Neerabup Partnership (the Proponent) is constructing an underground gas pipeline originating at a connection to the Dampier to Bunbury Natural Gas Pipeline (DBNGP) north of Muchea and terminating at a 330 MW gas-fired power station in the Neerabup Industrial Estate. The pipeline will supply natural gas to the power station, which will provide additional power into the South West Interconnected System (SWIS) during times of peak demand.

The pipeline will be approximately 30 km in length and will include development of a compressor station adjacent to the DBNGP connection (Figure 1-1). Construction of the pipeline will require clearing of vegetation within a construction corridor between 20 – 30m wide.

A 2 km 330 kV transmission line will be constructed to connect the power station to the Western Power Neerabup terminal substation. The route for the transmission line is adjacent to Old Yanchep Road and then Spence Road to the substation.

The primary purpose of the rehabilitation plan is the protection of the environment through ensuring areas disturbed by the pipeline and power line construction activities are restored and rehabilitated. The majority of the construction area has been previously disturbed, however, areas of native vegetation which have been rehabilitated in the past have shown high rates of revegetation.

Contractors will be required to comply with the environmental requirements of this Rehabilitation Management Plan (RMP) to manage the environmental aspects of their daily activities to allow for successful rehabilitation of the site. NewGen will review and approve the contractor's environmental management plans and work procedures to ensure they comply with the requirements set out in the RMP.

Following installation of the 330 kV transmission line, the transmission line easement was transferred to Western Power as advertised in the WA Gazette dated 19 March 2010.

1.2 Purpose and scope

This Rehabilitation Management Plan describes the actions required for the rehabilitation of the three components of the development, including the:

- gas pipeline corridor
- power station site (requires landscaping in line with the approved Neerabup Industrial Estate Landscape Masterplan Guidelines 2007 as the site is currently cleared)
- transmission line corridor.

Information pertaining to the implementation of various tasks (including broad requirements for weed control and revegetation), maintenance requirements and management actions for the different areas is included in this Plan. Monitoring approaches, contingency actions and the requirement for reporting is also outlined.

This Rehabilitation Management Plan has been developed in consultation with the Department of Parks and Wildlife (DPaW, formerly the Department of Environment and Conservation [DEC]).

The proponent is currently NewGen Neerabup Partnership. If the proponent changes at any time, the rehabilitation plan and all responsibilities within will be implemented and managed by the new proponent.

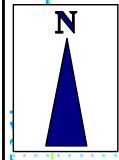
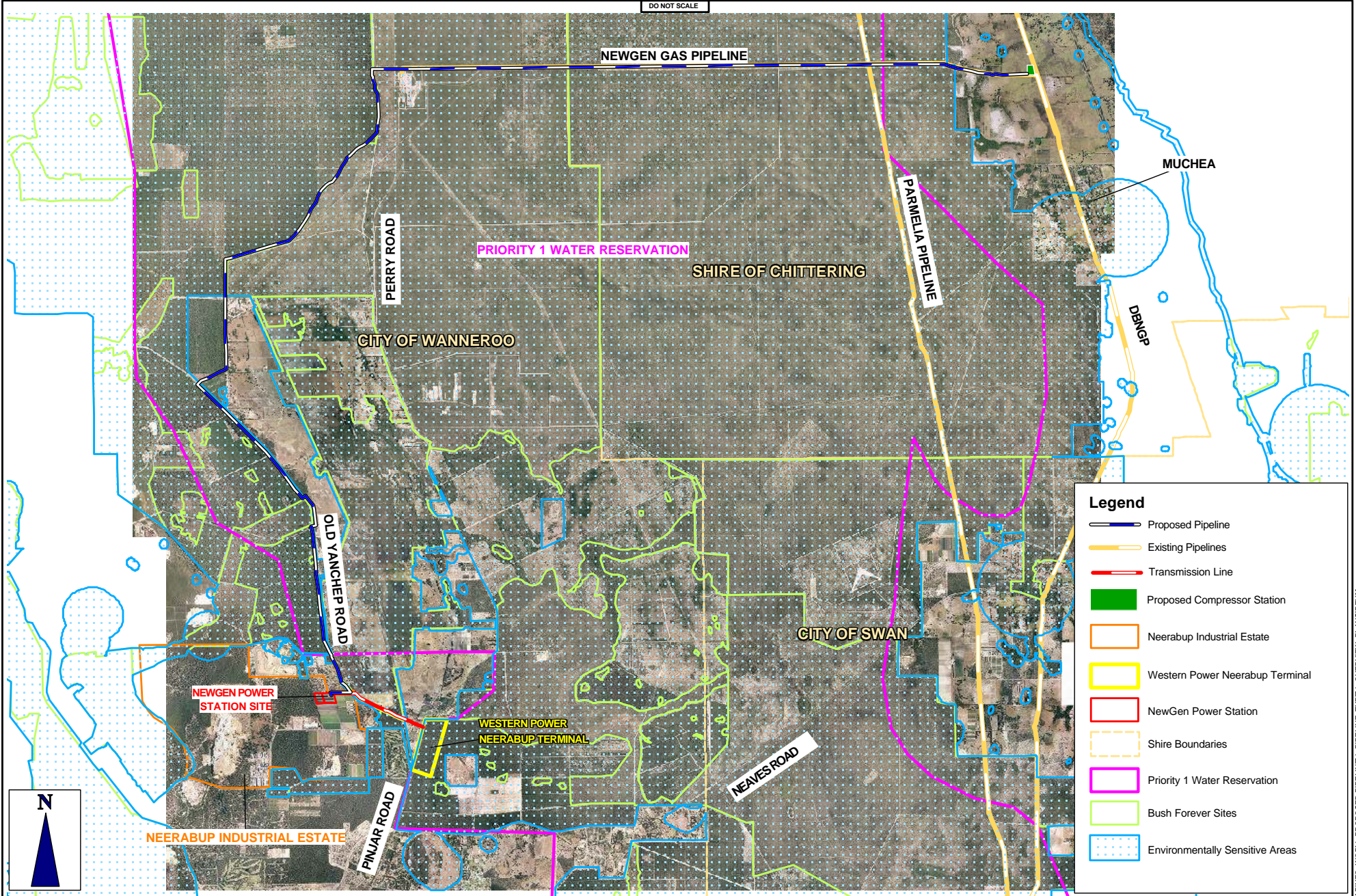
1.2.1 Location

The proposed development is located approximately 30 km north of Perth and approximately 10 km north of the Wanneroo townsite. The site for the power station is Lots 506 and 507 Pederick Road Neerabup within the developing Neerabup Industrial Estate (Figure 1).

The route of the gas pipeline extends connects to the DBNGP and runs approximately 30 km to the power station site (Figure 1).

The route for the 330 kV transmission line connecting the power station to the Western Power Neerabup terminal substation runs generally east for approximately 2 km (Figure 1).

DO NOT SCALE



M	10/06/03	ESA AREAS ADDED	CB	
L	03/06/03	ONC OPTION UPDATED (CURRENT REV 21, ONC, OPTION)	MA	
K	16/09/07	POWER STATION SITE UPDATED	RH	
J	27/07/07	REV 15 ONC OPTION	CB	
I	17/07/07	REV 10 ONC OPTION	CB	
H	05/07/07	REV 9 ONC OPTION	RH	
G	25/06/07	REV 8 ONC OPTION, COMPRESSOR STATION REVISED	RH	
F	18/06/07	REV 7 ONC OPTION	CB	
No.	Date	REVISION	Drawn	Surv

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 Metres
 SCALE 1:75 000
 DRAWN: C B 15/12/06
 SUPERVISOR:
 CHECKED:
 PLEASE REFER TO ASSOCIATED METADATA FOR ACCURACY STATEMENT

NewGen Power 330 MW Gas-fired Power Station
 Figure 1
 Infrastructure associated with the NewGen Neerabup Gas-fired power station
 DATUM: GDA 94
 ZONE: 50
 DRAWING NUMBER: 07197-001
 REV: M
 SIZE: A3
 DATE:

Z:\A_2007\07197\GIS\MAPINFO_WOR\PROPOSED_PIPELINE1_PIPELINE_TYPE1_OVERVIEW_PLANS\REV

2. Existing environment

2.1 Power station site

The power station site was previously cleared and operated as a market garden and contains no remnant vegetation.

2.2 Gas pipeline and transmission route

2.2.1 Vegetation

The proposed pipeline passes through a range of vegetation complexes as defined by Heddle *et al* (1980). The vegetation complexes on the dune systems within the alignment are well represented in the State Forest and conservation reserve system on the northern Swan Coastal Plain. The small areas of the proposed alignment within the Yanga complex, at the eastern end of the proposed alignment, is completely degraded agricultural land supporting only the occasional tree over pasture. The section of the proposed alignment within the Karrakatta - Central and South is located west of Lake Pinjar and is largely within tracks and pine plantations. Consequently, the proposed alignment occurs on tracks or in significantly cleared and degraded agricultural areas and so is of little significance in protecting native species and communities.

On the basis of earlier studies by Havel (1968) and Mattiske (2003), a series of site vegetation types were defined for the Gnangara Mound. These site vegetation types, recent mapping by Mattiske (2003) and the current field assessment were used to define the vegetation along the alignments. However, in assessing the values along the alignment, it must be recognised that much of the proposed pipeline and power line alignments occurs along already disturbed tracks, service corridors and in areas adjacent to tracks and pine plantations, which results in the majority of vegetation along the alignment being of low conservation value/significance.

Condition of the vegetation

The proposed pipeline and power line corridors occur on mostly already disturbed areas, tracks and in proximity to current tracks from near Muchea and the southern end of Lake Pinjar. Disturbances range from clearing for agricultural uses, and infrastructure to weed encroachment.

Areas where previous infrastructure has been installed have partially recovered from the disturbance as measured by the Keighery (1994) vegetation condition scale. Careful management of the disturbance and rehabilitation of the pipeline and power line corridors should not have a significant long-term impact on these areas.

The rest of the pipeline and power line corridors occur on agricultural lands, pine plantations and areas close to roads. On the edges of pine plantations and road reserves, the careful rehabilitation of these areas may improve their current condition. Parts of the corridor that occur on agricultural land will be restored back to its previous condition.

2.2.2 Flora

A total of 33 families, 91 genera and 151 species were found located along both the power line and pipeline (Appendix 2) with most being found within the proposed pipeline corridor. The diversity of flora is significantly greater in the undisturbed areas surrounding these corridors as determined by recent studies of the wider area. A recent botanical study on the Gnangara Mound, which combined a series of studies on the Gnangara Mound and the northern Swan Coastal Plain, highlighted some 963 vascular plant species from 91 families and 344 genera (Mattiske 2003). Of the species found, 13 are introduced but none of these are listed as Declared Plants under the *Agriculture and Related Resources Protection Act 1976* (WA).

A range of Rare and Priority Flora species have been recorded in past studies on the wider Gngangara Mound and Swan Coastal Plain that could, therefore, occur near the proposed pipeline and power line routes. However, based on previous studies for other project in the Gngangara area for a range of clients and state records, no Rare, Priority or Threatened flora are known to occur near the proposed alignment. This includes DRF species, pursuant to subsection (2) of section 23F of the *Wildlife Conservation Act 1950* (WA), taxa pursuant to section 179 of the *Environment Protection Biodiversity Conservation Act 1999* (Cwth) and Priority flora. In studies for this project, no Rare, Priority or Threatened Flora were located during the field survey, most likely due to previous disturbance of the pipeline, power line corridors and other infrastructure.

The weeds that were recognised on the sites include (Mattiske 2008):

- *Ehrharta calycina*
- *Ehrharta longiflora*
- *Eragrostis curvula*
- *Gladiolus caryophyllaceus*
- *Romulea rosea*
- *Raphanus raphanistrum*
- *Pelargonium capitatum*
- *Euphorbia terracina*
- *Leptospermum laevigatum*
- *Hypochaeris glabra*
- *Ursinia anthemoides*.

3. Objectives

The purpose of this Rehabilitation Management Plan is to provide a framework from which the following objectives can be achieved:

- ensure that all visual disturbances are removed by prompt remedial action to the greatest extent practicable
- reinstate the land to provide suitable conditions for natural re-colonisation of native vegetation and support natural surface water movement
- facilitate the establishment of native plant species, where native vegetation has been removed during the construction process
- ensure landscaping of the power station site is consistent with the *Neerabup Industrial Estate Landscape Masterplan* (Blackwell and Associates 2007).

3.1 Environmental completion criteria

The completion criteria were developed to incorporate the assigned objectives (Table 1). There are a number of factors that may affect achievement of targets, which are beyond the control of the proponent and their contractors (e.g. fire, vandalism, climate change).

The completion criterion relevant to species richness has been updated in consultation with DPaW.

Table 1: Performance targets for the factors associated with the NewGen Neerabup development

Aspect	Objective	Criteria	Assessment Method
Decommissioning	To ensure that all visual disturbances are removed by prompt remedial action to the greatest extent practicable.	All equipment, materials and litter are removed from the area of disturbance.	Visual inspection of the area of disturbance.
Erosion	To reinstate the land to provide suitable conditions for natural re-colonisation of native vegetation and support natural surface water movement.	Re-instatement of natural contours to pre-disturbance conditions.	Visual inspection of area of disturbance.
		No long-term erosion or sedimentation due to construction.	Visual inspection of area of disturbance.
		No active erosion rills in excess of the surrounding land.	Visual inspection and GPS record and physical measurement of any points of erosion.
Weeds	To facilitate the establishment of native plant species, where native vegetation has been removed during the construction process.	Minimise the spread and intensification of weed infestations through vehicle hygiene protocols.	Visual inspection of the area of disturbance, with backing from photographs, baseline surveys and rehabilitation monitoring datasets.
		The foliage cover of declared and environmental weeds within disturbed areas should be similar to vegetation immediately adjacent to the area of disturbance after 12 and 24 months.	Visual inspection of the area of disturbance, with backing from photographs, baseline surveys and rehabilitation monitoring datasets.

Aspect	Objective	Criteria	Assessment Method
Flora and Vegetation (where native vegetation has been removed during the construction process)	To facilitate the establishment of native plant species, where native vegetation has been removed during the construction process.	A minimum of 1 native plant per square metre when averaged over any 1 km length rehabilitated at 12 months. A minimum of 2 native plants per square metre when averaged over any 1 km length rehabilitated at 24 months.	Visual inspection of the area of disturbance, with backing from photographs, baseline surveys and rehabilitation monitoring datasets.
		Percentage foliage cover of native species indigenous to each plant community is greater than or equal to 40% of foliage cover in vegetation immediately adjacent to the area of disturbance after 24 months (excluding pipeline access track).	Visual inspection of the area of disturbance, with backing from photographs, baseline surveys and rehabilitation monitoring datasets.
		When averaged over any linear kilometre of the ROW, monitoring transects should have native taxa species richness of at least 50% of the mean species richness recorded from baseline vegetation plots. (Unless negotiated with DPaW/OEPA).	Visual inspection of the area of disturbance, with backing from photographs, baseline surveys and rehabilitation monitoring datasets.

4. Implementation

This implementation strategy describes the actions required to be undertaken during the construction of the NewGen Neerabup development to allow for the successful landscaping and rehabilitation of the area. The implementation strategy details the management of soils and dieback and introduced species during works, which include all management actions up to rehabilitation.

4.1 Weed and Dieback Management Protocol

4.1.1 Background and environmental risks

Construction activities have the potential to introduce or disperse weeds and diseases during operations on the NewGen Neerabup Gas Pipeline. The highest risk of weed and dieback spread will be during clear and grade operations and rehabilitation.

The highest risk of weed spread will be during the clear and grade and rehabilitation operations as weeds will be contained within the topsoil. As such, machinery associated with these operations will be cleaned down to remove all soil/organic matter when moving from disturbed/cleared areas into areas of native vegetation. Removal of topsoil will sufficiently reduce the risk of weed spread during other construction activities.

Dieback (caused by *Phytophthora cinnamomi*) affects the nutrient and water uptake of vegetation and causes it to “die back”, usually from the top of the vegetation, downwards. A dieback survey of the pipeline and transmission line routes has shown it to be dieback free in native vegetation areas (Figure 2 and Figure 3; Glevan 2008). The introduction of dieback to the pipeline corridor will be managed by hygiene points (Figure 2 and Figure 3).



DATA CAPTURE
Boundaries captured by GPS and positioned relative to map features





DATA VALIDITY
Hygiene Boundaries valid until 04 09
Uninfested Boundaries valid until 04 09

ADDITIONAL DATA
Aerial imagery: DLI March 2006
Isohyets: Bureau of Meteorology

AREA STATEMENT
Uninfested: 11.9 km
Uninterpretable: 0
Infested: 0
Unmappable: 18.4 km
Total: 30.3 km

MAPPING THRESHOLDS
Areas below threshold of 1mm on map are symbolised

LEGEND

-  Uninfested (Protectable) Area
-  Uninterpretable (Protectable) Area
-  Infested (Unprotectable) Area
-  Unmappable Area



Scale 1:65 000 @ A3

MAP DETAILS

Client: Stragen
Project: Dieback assessment
Site: Neerabup
Interpretation: EB 04/08
Digitising: EB 04/08

Figure 2
Gas pipeline dieback survey results and hygiene management points







LOCALITY



MAP DETAILS

Client: Straten
 Project: Pipeline Interp
 Site: Neerabup
 Interpretation: EB 07 08
 Digitising: EB 07 08

LEGEND

-  Uninfested (Protectable) Area
-  Uninterpretable (Protectable) Area
-  Infested (Unprotectable) Area
-  Unmappable Area

DATA CAPTURE
 detailed in report

MAPPING THRESHOLDS
 areas below 1mm on map
 symbolised



Figure 3
Transmission line dieback survey results and hygiene management points

AREA STATEMENT

Uninfested: X.XX ha
 Uninterpretable: X.XX ha
 Infested: X.XX ha
 Unmappable: X.XX ha
 Total: X.XX ha

Scale 1:15 000 @ A4
 ADDITIONAL DATA
 Aerial imagery: DLI March 2006
 Isohyets: Bureau of Meteorology



4.1.2 Purpose and scope

The purpose of this protocol is to provide for the management of construction activities to prevent the introduction and spread of weeds and dieback along the gas pipeline and transmission corridor and associated construction areas, to achieve the environmental objectives outlined below.

4.1.3 Environmental objectives and key performance criteria

Table 2: Environmental objectives and performance indicators for weed and dieback management

Issue	Environmental objective	Performance Indicator
Introduction of new weeds	To minimise the potential for new weeds to be introduced into the construction area from external sources.	No new species of weeds recorded in the construction areas within one year of completion of construction activities.
Threat of spreading weeds, pests and diseases	To minimise the risk of spreading existing weeds, pests and dieback across construction areas and to adjacent areas.	Hygiene management stations located at edges of areas of conservation value, dieback free and high-risk weed areas. No significant change to the extent and distribution of weeds, pests and dieback within one year of completion of construction activities compared to the extent and distribution of weeds, pests and dieback prior to construction.

4.1.4 Management actions

Table 3: Management actions for weed and dieback management

Activity	Action	Timing	Responsibility
Induction	The induction program shall involve hygiene training to ensure all personnel are aware of the requirements to prevent the spread of weeds, pests and diseases.	Induction	Construction Contractor
General requirements	Field surveys of dieback risk areas shall be completed to identify areas in the corridor as either dieback free, infected or uninterpretable and the Environmental Line List (ELL) updated with results.	Prior to ground-disturbing activities	NewGen
	Field surveys shall be completed to identify areas of significant populations of Declared Plants (as defined by the Department of Agriculture and Food Western Australia (DAFWA)), and aggressive environmental weed which may threaten the integrity of native plant communities (identified in consultation with DPaW). These areas shall be marked as 'high risk' weed areas on the ELL.	Prior to ground-disturbing activities	NewGen
	Construction areas containing native vegetation and also displaying weed covers in excess of 50% shall be selectively sprayed with a program of Glyphosate to reduce weed seed loads in the topsoil in order to improve establishment of native species in the rehabilitation.	Prior to ground-disturbing activities	Construction Contractor
	Bureau of Meteorology weather forecasts shall be used to schedule movements in risk areas, with movement through risk areas restricted during periods of wet weather.	Daily	Construction Contractor
	Any weed infestations noted during construction are to be reported to Construction Manager.	At all times	All employees
Access and vehicular/machinery movement	All vehicles and machinery accessing the construction corridor shall be washed down and checked to ensure they are free from soil/organic matter prior to arrival on-site (recorded as part of the mobilisation procedure) and marked accordingly.	Prior to entering the corridor	Construction Contractor
	Personnel shall remain on designated roads and access tracks and shall not go outside approved access areas.	At all times	Construction Contractor
	Vehicles that have been previously washed down and then move off the construction corridor but remain on bitumen or hard surfaces do not require clean-down prior to entering areas of the corridor with the same risk rating.	At all times	Construction Contractor

Activity	Action	Timing	Responsibility
Surveying	Distinctive flagging and signage shall be used to identify those areas of high risk for weeds and those areas known to be weed or dieback free.	Prior to ground-disturbing activities	Construction Contractor
	Corridor access hygiene points shall be identified on construction alignment sheets.	Prior to ground-disturbing activities	Construction Contractor
	Corridor access hygiene points shall be flagged in the field.	Prior to ground-disturbing activities	Construction Contractor
Hygiene	Entry to areas identified as 'dieback free' and areas of conservation value in the ELL will only be through hygiene stations.	Prior to construction	Environmental Manager
	Weed, pest and dieback hygiene stations shall be located at: <ul style="list-style-type: none"> • entry points for areas of conservation value • entry to areas which are 'dieback free' • entry and exit points for areas identified as 'high risk' for weeds. 	At all times	Construction Contractor
	Hygiene stations shall be at least 200 m from any watercourses/streams, Environmentally Sensitive Areas and vulnerable areas, provided no risk of contamination exists from within the area between the hygiene station and the area to be protected (hygiene buffer area). Where such risk of contamination may exist, the station shall be located as far from the area to be protected as will practically ensure no risk of contamination is present from the resulting hygiene buffer area.	At all times	Environmental Manager
	Signage shall be erected outlining the hygiene management procedure at each station.	At all times	Construction Contractor
	All construction machinery, including handheld tools in contact with soils, and vehicles shall be cleaned down at the hygiene management stations.	At all times	Construction Contractor
	Hygiene stations shall have a drain to collect and treat effluent from wash downs to ensure re-contamination does not occur.	At all times	Construction Contractor
	Personnel shall clean footwear each time they enter weed or dieback free area.	At all times	Environmental Manager
	If weed seeds and/or soil are found attached to vehicles, footwear, clothing and/or equipment, they shall be collected in a sealed container and disposed in accordance with the Waste Management Protocol (CEMP).	At all times	Construction Contractor
	All food scraps, including items which may contain seeds are to be removed from the construction site.	At all times	All employees
Construction materials	Construction materials (i.e. fencing, timber skids), brought on-site will need to be declared disease and weed free.	Prior to entering site	Construction Contractor
Clear and grade	All topsoil within identified 'high risk' or 'dieback infected' areas shall be stockpiled within that risk area and not with topsoil from lower risk or 'dieback free' areas.	At all times	Construction Contractor
Trenching	Stockpiles of weed and weed-free material, shall be kept separate.	At all times	Construction Contractor
	Infected soil shall be stockpiled in a manner that minimises the risk of being washed into the trench or out of the construction corridor.	At all times	Construction Contractor
	Drainage for weed infected areas shall be designed such that it prevents water draining into dieback or weed-free areas.	At all times	Construction Contractor
Bedding material	Bedding material imported to the site shall be certified as free of disease and/or weeds.	As required	Construction Contractor
Rehabilitation	Stockpiles of weed and weed-free material, shall only be re-spread back to their point of origin.	At all times	Construction Contractor
	Rehabilitation of disturbed areas shall be undertaken progressively to assist in reducing the spread of weeds.	At all times	Construction Contractor

4.1.5 Monitoring and recording

Table 4: Monitoring and recording of weed and dieback management

Parameter	Frequency	Location	Purpose	Responsibility
Stockpiles of topsoil and trench material	Daily	All access and construction activities.	To ensure that high risk weed and/or dieback infected material is stockpiled separately from other material.	Construction Contractor
Hygiene stations	Daily	Identified hygiene stations. Entry of 'high risk', 'dieback free' and conservation areas. Exit of 'high risk' or 'dieback free' areas.	To ensure that all vehicles, construction machinery (including handheld tools) and footwear is subject to hygiene management procedures on entering/exiting high risk or 'dieback free' areas.	Construction Contractor

4.1.6 Contingency actions

Table 5: Contingency actions for weed and dieback management

Trigger	Action	Responsibility
New infestation of weed(s) identified in areas of conservation value during construction	Identify source of weed infestation.	Construction Manager
	Undertake weed control immediately (or as appropriate) in consultation with the Department of Agriculture and Food WA (DAFWA) and DPaW. Follow up weed control during clean-up and rehabilitation.	Construction Manager
	Review hygiene management procedures.	Construction Manager
New infestation of 'high risk' weed(s)	Identify source of weed infestation.	Construction Manager
	Undertake weed control immediately (or as appropriate) in consultation with the DAFWA and DPaW. Follow up weed control during clean-up and rehabilitation.	Construction Manager
	Review hygiene management procedures.	Construction Manager
Weed infected and weed non-infected material and/or dieback infected and dieback free material are not stockpiled separately	Investigate cause of 'contamination'.	Construction Manager
	Ensure appropriate identification of high risk areas for environmental weeds and areas as 'dieback free', 'dieback infected' or 'uninterpretable'.	Construction Manager
	Dispose infected stockpiled material off-site to a suitable disposal location (to be determined in consultation with DPaW and DAFWA) to avoid contaminating non-infected areas.	Construction Manager
	Source dieback and weed-free material suitable for use in backfilling in consultation with DPaW and DAFWA.	Construction Manager
	Review hygiene management procedures.	Construction Manager
Reporting	Any breaches of the hygiene management procedures shall be reported to NewGen and DMP, and investigated.	Construction Manager

4.1.7 Hygiene management procedures

Hygiene protocols have been developed to contain and minimise the spread of weeds and dieback (caused by *P. cinnamomi*) during the construction period. Disturbed areas along the pipeline route may contain a number of environmental weeds. Hygiene operations will be required to reduce the risk of spreading weeds into undisturbed areas of the construction corridor. Any recorded locations and boundaries of *P. cinnamomi* or weed infestations will be identified on a map, and included in the ELL.

The primary method for vehicle clean-down in the field will be by blow-down rather than wash-down. Vehicle wash-down on the construction corridor is considered inappropriate, as it would provide wet surfaces for adhesion of soils and organic materials. However, wash-down will be required on the construction corridor during significant rain events when air-drying is impractical.

Clean-down for footwear and handheld tools, where required, is to follow standard clean-down protocols (possible methods to be employed include water wash-downs and brush-downs).

If water is used during clean-down, it is to be from a disease free source and once used, the spoiled water is to be diverted back into potential dieback infected and weed infested areas.

4.1.8 Clean-down procedures

Clean-down operations will involve:

- laying timber skids across boundary (e.g. between dieback infected areas and non-infected areas, boundary to areas of conservation value etc.)
- cleaning vehicles/construction machinery using an air-blower or high pressure water (e.g. to clean rake bucket and rake blade and undercarriage of machines and tyres etc.) inside the boundary of the disturbed/undisturbed area
- driving machinery from disturbed area onto timber skids
- cleaning tracks/wheels of machinery as the machine drives along the timber skids into the undisturbed area
- logging machinery hygiene inspections in machine daily log books
- audit of vehicle hygiene operations in the field
- ensuring the flow of water when washing down at the site flows towards, or is contained within, the dieback area; if washdown runoff naturally flows into dieback free areas, then a suitable sump will be constructed to contain all water from washdown activities in contaminated areas rather than flowing into dieback free areas.

4.1.9 Environmental weeds

Topsoil in the identified disturbed and cleared areas is potentially infested with environmental weed seeds. The machinery involved in the clear and grade, and rehabilitation operations will need to be cleaned down to remove all soil and/or organic matter when moving from disturbed/cleared areas into undisturbed areas. This will minimise the risk of spreading weed seeds and disease into undisturbed areas.

4.1.10 Clean-up and rehabilitation

Weed monitoring and management requirements have been included into the Clean-up and Rehabilitation Management Protocol (Section 5.1). As part of this protocol, the project footprint will be inspected for weed outbreaks approximately 4 to 6 weeks after the first significant rainfall event (greater than 5 mm). Active control of weed outbreaks in previously uninfected areas along the easement will be carried out in consultation with the relevant authorities.

4.2 Soil Management Protocol

4.2.1 Background and environmental risks

Topsoil is an important resource in rehabilitation as it provides nutrients, biomass and productivity for vegetation and contains a significant seed bank. Inappropriate soil management increases the risk of erosion, sedimentation, and mixing of the soil profiles, potentially resulting in environmental impacts on surrounding vegetation, waterbodies and residents.

Topsoil performs a vital role in rehabilitation processes, and the loss or contamination of topsoil (with subsoil) may reduce the success of rehabilitation efforts.

4.2.2 Purpose and scope

The purpose of this protocol is to provide for the effective management of soil and disturbed areas to achieve the environmental objectives outlined in Table 6.

4.2.3 Environmental objectives and key performance criteria

Table 6: Environmental objectives and performance indicators for soil management

Issue	Objective	Performance Indicator
Topsoil	Minimise change to soil profile from excavation activities.	No evidence of subsoil on surface (as detected by colour and texture) within construction areas. No visual evidence of soil compaction following rehabilitation (e.g. hard soil, local water pooling).
Erosion	Prevent occurrence of soil erosion during, and following construction.	The extent of soil erosion within areas of construction during, and within two years following construction is consistent with surrounding land. No visible soil erosion from areas of construction during, or within three years following construction.

4.2.4 Management actions

Table 7: Management actions for soil management

Activity	Action	Timing	Responsibility
Topsoil	The top 100 to 150 mm of topsoil shall be removed from: <ul style="list-style-type: none"> all areas to be subjected to excavation all areas where spoil from excavations is to be stored all areas where soil inversion or loss of topsoil is likely as a result of any activities associated with construction, including at facilities such as camp or office sites, laydown areas, etc. 	As required	Construction Contractor
	The top 100-150 mm of topsoil shall be removed from the excavation (bell holes) or the drilling platform locations.	As required	Construction Contractor
	Topsoil, including leaf litter shall be stockpiled to one or either side of the corridor with breaks provided in the stockpiles to allow water and fauna movement.	At all times	Construction Contractor
	The topsoil shall be stockpiled in a manner so that it can be easily returned to the construction corridor during reinstatement.	At all times	Construction Contractor
	Graded topsoil shall be stockpiled separately from cleared stockpiled ground cover vegetation and other excavated material (e.g. trench spoil, padding material, etc).	At all times	Construction Contractor
	Topsoil containment measures such as sediment fencing shall be used as necessary, especially during wet weather.	As required	Construction Contractor
Trench spoil	Trench spoil (backfill soil) shall be stockpiled separately from topsoil.	As required	Construction Contractor
	Trench spoil stockpiles shall be located immediately adjacent to the area from which soil was removed.	As required	Construction Contractor
Stockpiles	Topsoil stockpiles shall not be located where they have the potential to contribute to sedimentation of land or surface water.	At all times	Construction Contractor
	Stockpiles shall not be graded across property boundaries. A break in the windrow shall be maintained at property boundaries.	Property access points	Construction Contractor
	Vehicle movement over topsoil stockpiles shall be prohibited. Stockpiles will be breached at intervals to facilitate vehicle movements.	At all times	Construction Contractor
Erosion	Temporary and/or permanent soil erosion berms, drains and sediment barriers shall be installed, where required, for erosion protection.	As required	Construction Contractor
	Design of erosion and sediment control measures shall consider site conditions such as wind, rainfall frequency and intensity, soil type, infiltration rates, gradient, catchment area, vegetation cover and condition.	As required	Construction Contractor
	Construction work shall cease during extreme weather conditions.	As required	Construction Contractor
Padding	Where practicable, padding material shall be reclaimed from trench spoil.	As required	Construction Contractor

Activity	Action	Timing	Responsibility
	Imported padding material shall be certified weed and disease-free and be non-acid sulphate soils (ASS).	As required	Construction Contractor
	Topsoil shall not be used as backfill or padding.	At all times	Construction Contractor
	As much rock material as possible shall be returned to the trench, without threatening the integrity of the pipe coating.	As required	Construction Contractor
Rehabilitation	In the event that excavation (bell holes) or a drilling platform is required, topsoil shall be cleared from the site and stockpiled separately from subsoil to allow the subsequent backfilling of soil in the correct horizons.	At all times	Construction Contractor

4.2.5 Monitoring and recording

Table 8: Monitoring and recording for soil management

Parameter	Frequency	Location	Purpose	Responsibility
Erosion	Opportunistic	Active construction areas.	Ensure that erosion control measures are effective.	Construction Contractor
Stockpiles	Opportunistic	Stockpiles.	Ensure that separation of soil profiles is being observed. Ensure that stockpiles are not impeding access to property or fauna.	Construction Contractor

4.2.6 Contingency actions

Table 9: Contingency actions for soil management

Trigger	Action	Responsibility
Erosion	Investigate cause.	Construction Contractor
	Implement remedial action.	Construction Contractor

5. Rehabilitation

Landscaping involves streetscaping of medians and verges and landscaped gardens at the power station site. This will be in accordance with the Neerabup Industrial Estate Master Plan 2007. The Landscaping Masterplan was prepared with the aim of improving the visual amenity and maximising natural ecological and hydrological functions with perennial native vegetation within the Neerabup Industrial Estate Precinct.

The Masterplan includes provision for:

- 'waterwise' vegetation to be planted along verges and within median strips and formal swales to assist with creating an interesting landscape and maximising the intended function of swales
- native tree establishment within verges along roads consistent with the relevant council streetscaping plan
- details of requirements for lessees to use native Western Australian flora species suited to the soils of the area in their lot landscaping.

An emphasis on minimising irrigation and nutrient demand and the use of locally indigenous species will also assist in making the power station site sympathetic to the natural values of the adjacent areas and reduce the potential for detrimental changes in groundwater levels or quality.

There will be a need to undertake weed control following the disturbance of soil and establishment of the new roads. Chemical application is likely to be the primary form of control, with the most common weeds expected to be grasses and broadleaf weeds. The roads will be elevated from their current position and constructed on fill. The quality of the fill will largely determine the type and quantity of weeds that germinate in these areas.

5.1 Rehabilitation Protocol

5.1.1 Background and environmental risks

The final phase of the project is Clean-up and Rehabilitation (Reinstatement), which involves:

- removing construction materials from the construction corridor (e.g. skids, palletes, survey pegs, flagging, etc)
- shaping the land surface to match the existing contours, including compacting material back into side cuts
- ploughing or ripping of compacted areas by graders
- construction of final sediment and erosion controls from subsoil
- respread topsoil and cleared vegetation/brush across the construction corridor.

Effective rehabilitation will minimise the risk of introducing weed species, minimise disturbance of fauna through re-establishing habitat and stabilising disturbed areas; reducing the potential for erosion and sedimentation of surrounding water bodies.

Vegetation removed from the construction corridor will be respread to aid in sediment and erosion control, retain moisture and to aid establishment of seeds/seedlings and revegetation of the construction corridor. Active rehabilitation (seeding) in remnant vegetation will only be conducted on areas that do not respond to the initial rehabilitation treatment.

Aerial photography and land owner consultations have shown that the NewGen Neerabup Gas Pipeline easement traverses many areas of remnant vegetation that are currently used by land owners as firebreaks, stock routes and vehicle access tracks. Consequently, the quality of regrowth on the pipeline easement in many of these areas is poor. This protocol aims to re-establish the pre-construction land condition to that prior to construction, to the most practical extent.

NewGen will finalise rehabilitation objectives on private land, with the concerned landowner prior to ground-disturbing activities. These objectives and specific environmental management requirements will be added to the Environmental Line List (ELL) as required.

5.1.2 Purpose and scope of protocol

The purpose of this protocol is to guide reinstatement of the construction corridor and associated construction areas to achieve the environmental objectives outlined in Table 10.

5.1.3 Environmental objectives and key performance criteria

Table 10: Environmental objectives and performance indicators for rehabilitation management

Issue	Environmental objective	Performance Indicator
Vegetation	To re-establish vegetation and associated habitat areas to the condition that it was in prior to disturbance, or better.	Achievement of the completion criteria set out in Section 3.11.
Soil	To control sediment and erosion.	Achievement of the objectives set out in Section 4.2.3.

5.1.4 Management actions

Table 11: Management actions for rehabilitation

Issue	Action	Responsibility
ELL	Areas requiring rehabilitation other than spreading of vegetation and re-seeding shall be entered onto the Environmental Line List (ELL).	NewGen
General	The rehabilitation of disturbed areas shall be undertaken progressively where practicable so that the extent of disturbance is minimised and length of time for which topsoil and cleared vegetation are stored are minimised.	Construction Contractor
Clean-up	All waste materials (e.g. bags, pegs, skids, pillows) and equipment shall be removed from the construction areas once backfilling and tie-ins are completed.	Construction Contractor
	All flagging and bunding installed for other than environmental or safety reasons shall be removed from the construction areas once backfilling and tie-ins are completed.	Construction Contractor
	Small amounts of rocks and stones generated by the construction process shall be distributed evenly over the right-of-way. Where larger volumes of such material have been produced, consideration shall be given to its removal from site.	Construction Contractor
Infrastructure	All temporary gates shall be removed (unless required for operational reasons) and the fence reinstated to at least as good as the pre-construction condition. Gates removed from the fence line shall be returned.	Construction Contractor
	Any infrastructure disturbed during construction shall be restored to the landholder's satisfaction.	Construction Contractor
	Public roads and tracks used during construction shall be returned to their pre-construction state, or to a condition agreed to with the landholder.	Construction Contractor
	All fences which were cut and replaced by gates during construction shall be repaired to at least the equivalent pre-construction condition, unless permanent gates or other arrangements are agreed to with the landholder.	Construction Contractor
Trench	The trench shall be backfilled and suitably compacted to prevent water flows and erosion.	Construction Contractor
	On steep grades, stabilised sand bags or an approved alternative shall be placed in the trench prior to backfilling to prevent washout of the trench backfill and padding.	Construction Contractor
Recontouring	Disturbed areas shall be recontoured to reflect pre-disturbed contours as far as practicable	Construction Contractor

¹ There are obligations under the Department of Industry and Resources legislation to maintain the vehicle access track and certain completion criteria may not be achievable within the access track.

Issue	Action	Responsibility
	Environmental contour bunds shall extend the width of the right-of-way or disturbed surface. The discharge point shall be on adjacent undisturbed ground. Contours shall intercept water at approximately right angles to the direction of water flow.	Construction Contractor
Ripping	Areas subject to heavy volume traffic movements during construction that are to be rehabilitated shall be ripped to a depth of 30 cm, where necessary, prior to respreading topsoil.	Construction Contractor
Topsoil	Topsoil spreading will be managed in accordance with the Soil Management Protocol (Section 4.2) and with the completion criteria set out in Section 3.13.1.	Construction Contractor
Vegetation	Vegetation spreading will be managed in accordance with the Flora and Vegetation Management Protocol (CEMP) and with the completion criteria set out in Section 3.1.	Construction Contractor NewGen
Erosion	Erosion shall be managed in accordance with the Soil Management Protocol (Section 4.2) and with the completion criteria set out in Section 3.1.	Construction Contractor
	Barriers shall be constructed to deter third party vehicle access to rehabilitation areas. This may include the use of surplus rock, vegetation or log barriers.	Construction Contractor
Wetlands	Wetlands shall be managed in accordance with the Wetland Management Protocol (CEMP).	Construction Contractor
Weeds, pathogens, pests	Weed and disease management shall be managed in accordance with the Weed and Dieback Management Protocol (Section 4.1) and with the completion criteria set out in Section 3.1.	Construction Contractor

6. Monitoring

Monitoring procedures are outlined in Table 12 and Table 13. They discuss the methods of monitoring and the parameters to be addressed. Data collected during monitoring will indicate the need for planning of any maintenance works.

Photo point monitoring shall be conducted to monitor rehabilitation progress, with two photographs taken at each point – one in each direction along the corridor. At a minimum, two photopoints shall be undertaken with spacing no greater than 5 km. The distance between photopoints will vary along the corridor in order to capture the different landscapes and terrain traversed. In areas of conservation value, photo point monitoring shall be at 200 m intervals. In uncleared native vegetation areas, additional baseline photographs have been taken. All photo points will be recorded on the Environmental Line List, with monitoring sites located in nearby control areas (with similar vegetation) and in the rehabilitated areas of the pipeline easement.

Aerial photographs and land owner consultations have shown that the previously established easements through the remnant vegetation areas are currently used by land owners as firebreaks, stock routes and vehicle access tracks. Future access for vehicles in the future near the pipeline is critical for ongoing maintenance and operational activities along the pipeline. Therefore, parts of the easement will remain disturbed as a result of the need for an access track.

Because of the obligation to strip all topsoil, any monitoring quadrats shall be located immediately adjacent to the construction areas in vegetation type and density that is consistent with the area to be cleared. Monitoring shall be conducted annually post wet season until the rehabilitated areas have regenerated to a stable condition, to the satisfaction of DPaW. After completion, the entire construction corridor shall be reviewed for bare areas and weed infestations. Once the rehabilitation programme is complete, this monitoring shall be captured in the ongoing operational management of the NewGen Neerabup Gas Pipeline. Propagule augmentation may be necessary to achieve completion criteria.

Table 12: Landscape areas monitoring program within power station site

Objective	Parameter	Frequency/Duration	Purpose
Ensure landscaping and revegetation is consistent with the Neerabup Industrial Estate Landscape Masterplan 2007	Exotic flora (% cover)	Informally monitor at least quarterly	To ensure objectives and performance targets are achieved
	Erosion	Informally monitor at least quarterly	To ensure erosion is not occurring

Table 13: Monitoring and recording of rehabilitation in pipeline and transmission line corridors

Issue	Action	Timing	Responsibility
Native species	Species abundance and, distribution within the construction corridor after rehabilitation.	12 months after rehabilitation	NewGen
	Records of visual and photo monitoring.	Prior to clear and grade and immediately following rehabilitation	Construction Contractor
	Records of visual and photo monitoring.	12 months after rehabilitation	NewGen
Weed assessment	Quadrant and photopoint monitoring of rehabilitation in areas of remnant vegetation.	Immediately following rehabilitation	Construction Contractor
	Weed species richness and cover to facilitate management of weed issues.	Following completion of rehabilitation	Construction Contractor

Issue	Action	Timing	Responsibility
Erosion	Inspections of the soil shall be undertaken in the 12-month period following the completion of construction to determine subsequent erosion and changes in the drainage patterns, and any further rehabilitation measures required determined in consultation with regulators.	12 months following rehabilitation	NewGen
	Records of visual and photo monitoring.	Prior to clear and grade and following rehabilitation	Construction Contractor
Landowner satisfaction	Following rehabilitation, NewGen and the Construction Contractor shall meet with affected landowners to discuss rehabilitation and further ongoing management.	Following rehabilitation	Construction Contractor NewGen

7. Contingency actions

If monitoring indicates that the criteria are not being met after 12 months remedial action shall be discussed with DPaW and DMP. Remedial action within failed areas may include active reinstatement such as ripping, seeding or active weed control. In the event that reseeding is required, DPaW will be invited to participate in the reseeding process (e.g. identify suitable seed lists, witness reseeding activities).

Areas of extensive weed cover will be treated, with a program developed in consultation with DAFWA and DPaW, and designed to ensure weed infestations are at least comparable to pre-construction levels and, where possible, less than those baseline levels.

While best endeavours will be made to achieve these Completion Criteria there may be some exclusions in the event that uncharacteristic seasonal weather conditions prevail. This shall be taken into consideration in relation to the Completion Criteria. In the event of areas not meeting Completion Criteria, joint site reviews will be undertaken to determine appropriate remedial action, if required, to DPaW requirements.

8. Stakeholder consultation

NewGen has undertaken a program to identify and consult with stakeholders, including local residents and all landholders whose properties will be affected by the project, to inform them of the proposed schedule of construction works and the actions that will be undertaken to minimise potential impacts.

NewGen and its contractors will continue this consultation program to ensure stakeholders are kept informed and to minimise disruption to landowners affected by both pre-construction and construction activities. Many of the management actions, particularly those with the potential to impact on neighbouring residences including dust, noise and rehabilitation, require continued ongoing consultation with landowners.

As part of this consultation program, NewGen has also consulted and will continue to consult with a number of regulatory authorities, including:

- Department of Water (licence required for water supplies and operation within Gnangara mound Water Reserve under the *Rights in Water and Irrigation Act 1914*)
- Department of Environment and Conservation (development of protocols for activities regulated under the *Conservation and Land Management Act 1984* and the *Wildlife Conservation Act 1950*)
- Environmental Protection Authority Service Unit (proposal has been formally referred under the *Environment Protection Act 1986*)
- Department of Industry and Resources (approval of this CEMP under the pipeline licence issued under the *Petroleum Pipelines Act 1969*)
- Department of Planning and Infrastructure (*Land Administration Act 1997*).

The major issues raised by the agencies related to management of clearing of vegetation, dieback and weeds, and fauna impacts and handling. Discussions have been held with the agencies on the major issues of concern, the results of which have formed the basis for the management protocols presented in the CEMP.

A Land Management Plan sets out the performance standards and key management requirements for the management of access to land, and the establishment and maintenance of good relations with landowners and occupiers affected by the project.

9. Review and revision

Revision of the rehabilitation plan and associated CEMP Protocols may be required to ensure that the proposed management actions are current and effective in achieving the management objectives. As such, a “change management” process is required to ensure that regulatory bodies and the proponent may request and be involved in the development of new or additional management protocols. The “change management” process must be capable of ensuring that all versions of the document, held by the various parties, are updated with recent amendments.

10. Reporting

The proponent shall provide an annual report on the progress of the rehabilitation works. This will include results and recommendations from informal and formal monitoring. Reporting will include:

- photographs showing progress of the site
- discussion of the results with respect to the performance targets, any other comments of importance and recommendations for the following year
- appendices containing monitoring data.

This report will be forwarded to DPaW for their information.

11. References

- Environmental Protection Authority (EPA) 2000, *Phytophthora cinnamomi and the disease caused by it – a protocol for identifying protectable areas and their Priority for management*, Invitation for Public Comment.
- Glevan Consulting, 2008, *Dieback Assessment of the NewGen Neerabup Gas Pipeline Corridor*, Unpublished report to Strategen.
- Mattiske Consulting Pty Ltd (Mattiske) 2007, *Flora, Vegetation and Fauna Values of the Proposed NewGen Pipeline, Pinjar, Western Australia*, Prepared for NewGen, Perth, August 2007.
- Mattiske Consulting Pty Ltd (Mattiske) 2003, *Flora and Vegetation Studies. Gnangara Mound Stages 1, 2 and 3. Parts A, B and C*. Unpublished report prepared for Water and Rivers Commission and Water Corporation, December 2003.
- NewGen 2007, *330MW Gas-fired Power Station Neerabup – Project Referral (October 2007)*, Unpublished report to the Environmental Protection Authority.