17A TERRESTRIAL ECOLOGY

17A.1 INTRODUCTION

This chapter provides further assessment and information on terrestrial flora and fauna for the Supplementary Environmental Impact Statement (EIS), based on the findings of a supplementary seasonal survey (February 2009), response to various submissions on the EIS and refinements/modifications to the Project since the publication of the EIS, including riparian vegetation management, weed management and assessment of impacts subsequent to the EIS. The information presented builds on the EIS Volume 1, Chapter 17A Terrestrial Ecology and should be read in conjunction with the EIS chapter.

Chapter 6 Project Operations of the Supplementary EIS provides further details on changes to the Project.

Further detailed information is located in the Addendum to the terrestrial ecology technical report relating to the Supplementary EIS, presented in STR17A-1-SV1.5 Supplementary Terrestrial Ecology Impact Assessment.

The specific objectives of the terrestrial ecological assessment are as described in the EIS Volume 1, Chapter 17A Terrestrial Ecology, Section 17A.1.

17A.2 METHODOLOGY

Unless otherwise noted, the methods adopted for the supplementary terrestrial flora and fauna assessment are the same as those for previous surveys as described in EIS Volume 1, Chapter 17A Terrestrial Ecology and the associated technical report.

This chapter presents responses to various submissions on the EIS, and the findings of the supplementary seasonal survey undertaken in February 2009, for the gas supply pipeline. No additional desk-based assessment was completed for the gas supply pipeline or the MLA areas, and no additional field surveys were required for the MLA areas for which seasonal survey results were presented in the EIS. However, the impact assessment for the MLA areas has been reviewed and updated in light of refinements/modifications to the changes in Project and mine scheduling since the publication of the EIS.

17A.2.1 RELEVANT LEGISLATION AND POLICIES

The legislation pertaining to terrestrial flora and fauna remains the same as presented in the EIS Volume 1 Chapter 17A Terrestrial Ecology, Section 17A.2 and associated technical report. However, one legislative amendment and one new draft policy are relevant to this supplementary assessment: *Vegetation Management (Regrowth Clearing Moratorium) Act 2009*, and the Consultation draft Policy for Biodiversity Offsets (EPA 2008).

On 7 April 2009, the Queensland Government announced a three-month moratorium on clearing high-value regrowth vegetation. The moratorium took legal effect on 8 April 2009 under the *Vegetation Management (Regrowth Clearing Moratorium) Act 2009*, and has subsequently been extended to 7 October 2009. The Moratorium does not affect the exemption for “specified activities”, which includes mining activities within mine tenements under the *Integrated Planning Act 1997*.

Some small areas of regrowth vegetation within the study area fall under this moratorium as described in the Supplementary EIS technical report STR 17A-1-SV1.5.

The Queensland Government has developed a draft policy on biodiversity offsets for public consultation. The draft policy is not intended to replace offset programs already in place, such as those required under the *Vegetation Management Act* (Department of Natural Resources and Water 2007). At the time of drafting the Supplementary EIS, no final Policy for Biodiversity Offsets had been released. The draft policy is considered below.

17A.2.2 DESCRIPTION OF STUDY AREA

The operation of the Wandoan Coal Project is as generally described within the EIS. However, some refinements/modifications to Project elements within the MLA areas since the publication of the EIS will affect the extent of vegetation clearing and the likely impacts of the Project on biodiversity including the scheduling of mining of Frank Creek Pit, deferral of Woleebee South Pit from the 30-year schedule, addition of Wubugal Pit, and changes to the tailings disposal strategy. These modifications are described in Chapter 6 Project Operations of the Supplementary EIS.

17A.2.3 STUDY METHODOLOGY

Field surveys were undertaken in the study area in February 2009 to verify ecologically sensitive areas and species of plants and animals that are known or likely to occur in the study area and surrounds.

The gas supply pipeline corridor was surveyed through the attendance of previous tertiary and secondary level vegetation assessment sites and vegetated areas that had not been previously surveyed, while the previously surveyed sites (August 2008) were assessed for changes in floristic composition as determined during the winter survey effort and presence of threatened and regionally significant taxa. The location of flora survey effort is shown in the Supplementary EIS technical report STR 17A-1-SV1.5.

The occurrence of fauna species in the gas supply pipeline study area was investigated by assessing the suitability of available habitat for fauna, as well extensive opportunistic and systematic targeted surveys, including harp trapping, ultrasonic bat detection, spotlighting, call broadcast, active searches for herpetofauna, nocturnal vehicle traverses, birds and other incidental evidence of fauna. Fauna habitat assessment and surveys were focused predominantly on threatened species, migratory birds and priority taxa for the southern Brigalow Belt bioregion. The location of the fauna field survey effort is presented in the addendum to the technical report STR 17A-1-SV1.5.

17A.3 EXISTING ENVIRONMENT

This section describes the existing environment as it applies to the gas supply pipeline and builds on the previous surveys presented in the EIS Volume 1 Chapter 17A Terrestrial Ecology and associated technical report. A description of the terrestrial ecology environment for the MLA areas is as presented in the EIS Volume 1 Chapter 17A Terrestrial Ecology technical report, and no update has been necessary for this chapter.

17A.3.1 REGIONAL CONTEXT

The vegetation assessment and subsequent RE determinations applied to the remnant and non-remnant areas of vegetation remained relatively unchanged from those established during the dry season survey effort for the gas supply pipeline.

17A.3.3 REGIONAL ECOSYSTEMS

The vegetation assessment and subsequent RE determinations applied to the remnant and non-remnant areas of vegetation remained relatively unchanged from those established during the dry season survey effort for the gas supply pipeline. Mapping of REs and non-remnant vegetation is provided in Attachment E of the EIS Technical Report TR 17A-1-V1.5, with Figure 17A-2-SV1.3 indicating the locations of regional ecosystems on the MLA areas and gas supply pipeline.

17A.3.4 SPECIES OF PLANT

Detailed floristic inventories did not yield any species that had not already been recorded during the dry season (August 2008) survey effort along the gas supply pipeline. Threatened species and ecological communities located in the study area are detailed in the EIS, Section 17A.3.4 and the associated technical report, with Figure 17A-2-SV1.3 indicating the locations of the significant flora populations. Seasonal floral surveys did not identify any additional threatened plant species listed under the EPBC Act.

Acacia melvillei (Yarran) and *Swainsona swainsonioides* (Downy Swainson-pea) were the only priority taxa species of plant for the Brigalow Belt South recorded during previous surveys. *Acacia melvillei* was recorded in patches of RE 11.9.5 and 11.9.6 (remnant and regrowth) while *Swainsona swainsonioides* was recorded infrequently in RE 11.3.25. The summer flora survey of the gas supply pipeline performed in February 2009 failed to identify any additional priority taxa.

17A.3.5 FAUNA HABITATS

Five broad habitat types exist within the gas supply pipeline study area: *Acacia*-Belah Scrub/Woodland (i.e. Brigalow), Box Woodland, Queensland Blue Gum Riparian, Cleared Lands and Aquatic/Wetland habitats. A description of these habitat types is presented in the EIS Volume 1 Chapter 17A Terrestrial Ecology and associated technical report.

17A.3.6 SPECIES OF ANIMAL

Combined field surveys identified 144 species in the gas supply pipeline study area, comprised of 12 frogs, 21 reptiles, 27 mammals and 84 species of bird, as presented in Table 17A-1, with Figure 17A-2-SV1.3 indicating the locations of significant animal species during field surveys. This included one species of national significance, the vulnerable Brigalow Scaly-foot (*Paradelma orientalis*) and the state significant rare Little Pied-bat (*Chalinolobus picatus*). Several other species of prominent conservation value were recorded including the Great Egret (*Ardea alba*) listed under the 'migratory' provision of the EPBC Act and seven species considered 'priority taxa' by the Southern Brigalow Belt Expert Fauna Panel (Environment Protection Agency and Environmental Planning Southwest Queensland 2002). An additional species, the Little Forest Bat (*Vespadelus vulturnus*) has also been considered significant given it reaches its northern distributional limit in the study area.

Table 17A-1: Summary of species of terrestrial fauna identified in the gas supply pipeline study area

Taxa	Gas pipeline (winter surveys	Gas pipeline (summer surveys)	Native species	Introduced species	Total
Mammals	19	16	21	6	27
Birds	75	72	83	1	84
Frogs	4	12	11	1	12
Reptiles	10	20	21	0	21
Total	108	120	136	8	144

The summer survey recorded substantially more herpetofauna than the earlier winter survey. This is attributed to increased reptile and amphibian activity as a result of warmer weather and rainfall during the summer survey.

The summer season (February 2009) survey confirmed the presence of the Brigalow Scaly-foot (*Paradelma orientalis*), which was the only EPBC Act-listed threatened species of animal recorded during the summer surveys. This species was recorded twice during the earlier surveys and re-recorded twice during the summer surveys. Both summer recordings were made at two new locations within the gas supply pipeline study area in association with non-remnant *Acacia harpophylla* and/or *Casuarina cristata* open forest, within road side vegetation along Nathan Road. Brigalow Scaly-foot is currently listed as a vulnerable species pursuant to the EPBC Act and Nature Conversation (NC) Regulation.

In addition, six regionally significant species (Salmon Striped Frog *Limnodynastes salmini*, Brigalow Scaly-foot *Paradelma orientalis*, Carpentaria Snake *Cryptophis boschmai*, Common Brushtail Possum *Trichosurus vulpecula*, Red-necked Wallaby *Macropus rufogriseus*, Rufous Bettong *Aepyprymnus rufescens*) were recorded in the gas supply pipeline study area. No migratory species were recorded within the study area during summer field surveys.

Thirty-one non-threatened priority taxa species of animal for the Brigalow Belt South (Environmental Protection Agency and Environmental Planning Southwest Queensland 2002) were considered likely to occur within the gas supply pipeline alignment and surrounds based on likelihood-of-occurrence assessment.

Thirteen of these species were detected within habitat associated with the gas supply pipeline alignment during the winter field surveys. Summer fauna surveys of the gas supply pipeline identified two additional priority taxa (Carpentaria Snake *Rhinoplocephalus boschmai* and Rufous Bettong *Aepyprymnus rufescens*) and re-recorded four priority taxa. Rufous Bettong and Carpentaria Snake have been infrequently recorded in the Wandoan and Grosmont areas, however, it is likely they inhabit most of the riparian habitats and associated vegetated creek flats in the area.

17A.4 POTENTIAL IMPACTS

Impacts associated with the Project, including the mine pits and infrastructure and gas supply pipeline, are the same as those described in the EIS Volume 1, Chapter 17A Terrestrial Ecology chapter and technical report.

17A.4.1 LOSS OF VEGETATION AND HABITATS (LAND CLEARANCE)

Due to modifications of the pits and infrastructure within the MLA areas, the extent of clearing has been recalculated and is presented in Table 17A-2.

Clearing within the MLA areas and the gas supply pipeline alignment is likely to result in removal of 319.1 hectares of remnant vegetation, of which 27.6 hectares are listed as remnant endangered (DERM Biodiversity Status), and 471.7 hectares of non-remnant vegetation. The non-remnant vegetation includes 13.1 hectares of EPBC listed endangered vegetation (RE 11.9.4). Overall this is a reduction in the extent of vegetation that was proposed to be cleared in the EIS, being 790.8 hectares now as opposed to an original estimate of 1,170 hectares, having a decrease of 379.2 hectares. Within the MLA areas, 82% of remnant vegetation and 53% of non remnant vegetation will be retained, compared with 63% of remnant and 51% of non remnant vegetation stated the EIS.

Regional vegetation management code associated with the gas supply pipeline

Clearing of native vegetation for the purpose of a significant project under the *State Development and Public Works Act 1971* (section 26) is a relevant purpose under the *Vegetation Management Act 1999* for which a vegetation clearing permit can be granted under the *Integrated Planning Act 1997*. The vegetation clearing will be assessed against the performance requirements outlined in the Regional Vegetation Management Code. In the case of the gas supply pipeline alignment, the code is that for the Brigalow Belt and New England Tablelands bioregions (Department of Natural Resources and Water 2006) and the specific performance requirements for significant projects (Part S). Where an acceptable solution includes different solutions depending on the bioregion or the subregion, only those relevant to the Project area are mentioned.

For performance requirements that include maintaining the current extent of assessable vegetation, offsets are an acceptable solution. In total, 1.1 ha of remnant and 0.2 ha of non-remnant vegetation will potentially be clearing as a result of the gas supply pipeline.

The performance requirements of the Code and their application to the gas supply pipeline are presented in the Supplementary EIS terrestrial ecology technical report STR 17A-1-SV1.5, Section 6.1, including:

- PR S.1: Limits to clearing
- PR S.2: Wetlands
- PR S.3: Watercourses
- PR S.4: Connectivity
- PR S.5: Soil erosion
- PR S.6: Salinity
- PR S.7: Conserving remnant endangered regional ecosystems and of concern regional ecosystems
- PR S.8: Essential habitat
- PR S.9: Conservation status thresholds
- PR S.10: Acid sulfate soils.

Table 17A-2: Extent of proposed vegetation clearing

Mine component	Remnant status	Extent of each RE type directly affected (ha)								Total
		11.3.2 N/OC/NL	11.3.25 N/OC/NL	11.9.4 E/E/E	11.9.5 E/E/E	11.9.7 OC/OC/NL	11.9.10 OC/E/NL	11.10.9 N/N/NL	Other non-remnant vegetation	
Mining pits	Remnant	0	209.8	0	16.2	0	3.0	0		229.0
	Non-remnant	6.0	0	8.1	191.6	0.1	141.4	0	18.2	364.0
Infrastructure on MLA	Remnant	0	80.6	0	6.4	0	2.0	0		88.9
	Non-remnant	0	0.1	5.0	22.8	23.4	52.7	1.0	1.1	106.1
Gas pipeline (not on MLA)	Remnant	0	1.1	0	0	0	0	0		1.1
	Non-remnant	0	0.2	0	0	0	0	0	0.0	0.2
Total proposed clearing	Remnant	0	291.5	0	22.6	0	5.0	0.0		319.1
	Non-remnant	6.0	0.3	13.1	214.4	23.5	194.1	1.0	19.3	471.7
Change from EIS	Remnant	—	—	0	—	0	—	0		—
	Non-remnant	0	0	0	—	+	-	0	0	—

Notes: heterogeneous polygons are included above as the dominant

* RE. N = Not of concern/No Concern, OC = Of Concern, E = Endangered, NL = Not Listed

** change: 0 = within 10 hectares of original mine layout, - = reduction of greater than 10 hectares from original layout, + = increase greater than 10 hectares from original layout

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The gas supply pipeline will meet the performance requirements of the regional vegetation management codes, provided that during detailed design and construction of the gas supply pipeline, the final pipeline alignment is located to avoid the remnant vegetation in the four areas where the remnant vegetation is less than 200 metres in width and with the provision of suitable offsets to maintain the current extent of vegetation.

17A.4.6 NOISE AND DUST

Dispersion modelling has been undertaken to assess the potential impact of the Project on the dust deposition rate at the Wandoan township and surrounding sensitive receptors. The results show that the Project will demonstrate compliance with the annual average acceptable criteria of 120 mg/m^2/day for dust deposition rate for Year 1, 5, 10, 20 and 30. Note that the greatest component of dust predicted to be generated by the Project is associated with crustal matter (earth), rather than coal dust.

The University of Sydney conducted a study on the effect of coal dust deposition on plant growth (Campbell 1995). This study found that:

- coal dust deposition rates up to 130 mg/m^2/day above ambient background levels are unlikely to affect photosynthesis
- coal dust loadings on individual leaves is likely to be lower than dust loadings as expressed on a land area basis (i.e. m^2)
- coal dust deposition rates of approximately 320 mg/m^2/day may begin to cause a reduction in photosynthesis
- coal dust deposition rates of greater than 5,000 mg/m^2/day can result in a 5 degree increase in leaf temperature.

Following mitigation, to minimise dust production, the residual impacts from dust deposition to crops and plant photosynthesis outside of the MLA are predicted to be insignificant.

17A.4.8 SIGNIFICANCE OF IMPACTS

A number of Threatened RE's, communities, species of plant and species of animal have been recorded in the MLA areas and gas supply pipeline study areas or are considered likely to occur (moderate or high likelihood), and may be affected by the Project.

Impacts on Threatened species and communities listed under the EPBC Act are required to be assessed following the *Principal Significant Impact Guidelines*. An assessment of the significance of the impact to State-listed REs and Threatened species was also undertaken.

The results of the summer (February 2009) surveys of the gas supply pipeline or the modifications to the MLA areas did not significantly change the significance assessments for these communities and species as detailed in Volume 1 Chapter 17A Terrestrial Ecology technical report TR17A-1-V1.5.

The assessment of matters of environmental significance are discussed in the EIS Volume 1, Chapter 17A Terrestrial Ecology technical report TR 17A-1-V1.5, Section 6.7, and have not altered as a result of further survey or due to refinements/modifications to the Project.

Overall, and consistent with the EIS, the impact assessments conclude that the Project is not likely to have a significant impact on threatened species or communities, nor will it interfere with their recovery, assuming suitable mitigation measures are put in place as outlined in Section 17A.5 of the EIS and Supplementary EIS.

17A.5 MITIGATION MEASURES

Mitigation measures are the same as those described in the EIS Volume 1 Chapter 17A Terrestrial Ecology, Section 17A.5, and technical report. The modification to some of the pits has not modified the mitigation measures required. However the reduction in amount of vegetation clearing within the MLA areas will result in variation in the offset requirements.

17A.5.2 MANAGEMENT OF THE MITIGATION PROCESS

Riparian vegetation mitigation measures

As stated in EIS Volume 1, Chapter 17A Terrestrial Ecology, Sections 17A.4.1, 17A.4.2 and 17A.4.3 the removal of riparian vegetation communities and habitat would impact upon areas recognised as being of regional significance under the Biodiversity Planning, a state significant wildlife corridor, and will reduce the extent of riparian habitats and contribute to habitat fragmentation. Section 17A.5.1 of the EIS states that avoiding environmental impacts is the preferred approach by the WJV. Throughout the development of the Project's feasibility, detailed design and ongoing operational mine scheduling over the life of the Project, minimising impacts upon riparian areas through not mining riparian areas will be considered wherever possible.

The Project's biodiversity and land management plan will include clear objectives and actions for the Project including minimising impacts to riparian and aquatic habitats and species. In undertaking this commitment, protection fencing of watercourses and other measures installed around riparian areas by previous landowners and environmental groups such as Landcare and Greening Australia, will be considered and where practical, be inspected, repaired and maintained over the life of the Project, until such time as the measures are removed to undertake mining operations.

The EIS, Sections 17A.5.2 and 25.4.6, states that all areas cleared due to mining activities, including creek diversions, will be progressively rehabilitated. For creek diversions, rehabilitation including revegetation will be undertaken within 1 month of earthworks being completed for any creek diversion to the extent practicable. Creek diversion construction will be commenced approximately 4 years prior to any creek diversion being required to accommodate creek flow, as far as practicable. As stated in EIS, Section 11.6.1, creek diversions will follow a detailed creek diversion strategy. Creek diversions will require approval under the *Water Act 2000* by the Department of Environment and Resource Management, with further information provided in the Supplementary EIS, Chapter 11 Water Supply & Management, Section 11.6.

The WJV recognises that revegetated creek diversions will not immediately be able to replicate the habitat functions of an established riparian ecosystem, however will be designed to encourage continued fauna movement by connecting fauna habitats, before maturing into viable fauna habitat. Vegetation maturity ultimately depends on the various species used in the revegetation, however many native species require 15 years or more.

As described in Section 25.4.6, creek diversions will be designed with best-practice measures to provide stable landform. At the conclusion of mining, the creek diversions will comprise riparian vegetation and aquatic habitat in accordance with the creek diversion rehabilitation plan.

Rehabilitation and revegetation mitigation measures

As described in the EIS Section 25.4.6, progressive rehabilitation of worked areas will be undertaken within two years of becoming available or as soon as practicable thereafter. Details of the final design for each domain are dependent on the geology, groundwater and surface water hydrology and ecology of the area.

As part of the Plan of Operations and Biodiversity and Land Management Plan, revegetation and rehabilitation plans will include planting of a range of locally occurring native shrubs, trees and groundcover plants, in keeping with the former vegetation types present. Choice of species will include *Allocasuarina*, *Eucalyptus*, *Angophora* and *Corymbia* species to compensate for any impacts to various species' habitats, including koalas and hollow dependent species.

Rehabilitation and revegetation plans will be progressively updated with each Plan of Operations, and implemented during the designated and approved Plan of Operations period. By the time the mine is decommissioned, rehabilitation and revegetation would be extensive over the areas previously mined, due to the progress revegetation of mined areas. Costs associated with rehabilitation and revegetation are part of the Project's operational costs, and do not form part of the biodiversity off-set expenditure.

Weed management

As part of the Biodiversity and Land Management Plan, a pest management procedure will be developed to control weeds on site during the construction, operational and decommissioning phases of the Project. The WJV's Environmental Representatives for the Project will be responsible for the development and implementation of the weed management procedures as part of the Biodiversity and Land Management Plan.

As part of its Mineral Development Licence (MDL) activities, the WJV already implements pest management procedures, including weed management, across the MLA areas including vehicle washdown procedures for weed control, weed spraying, and inclusion of Parthenium (*Parthenium hysterophorus)* weed and other weed awareness in inductions to working on the site.

Regarding the broader issue of weed management on land owned or managed by the WJV, from the time that the WJV acquires and takes management control of properties, a pest management procedure will be implemented to control various Class 2 declared plants and other noxious weed species present on the land parcels. The EIS Volume 1, Chapter 17A Terrestrial Ecology, Table 17A-2, identifies seven species of declared plants listed under the *Land Protection (Pest and Stock Route Management) Act 2002*, with control of these species, including Parthenium, a priority for the WJV.

In additional to these seven species, fourteen weed species have been identified by landholders and the former Taroom Shire Council Pest Management Plan as potentially present within the MLA areas or on WJV owned land. These weeds are listed in Table 17A-3 below. Provision for the management of these species, if identified on WJV land parcels, will be included in weed management procedures.

Table 17A-3: Weed species identified in areas adjoining the MLA areas

Scientific name	Common name	Class
Gleditsia triacanthos	Honey Locust	1
Parkinsonia aculeate	Parkinsonia	2
Sporobolus pyramidalis	Giant Ratstail Grass	2
Eriocereus species	Harrisia Cactus	2
Lycium ferocissimum	African Box Thorn	2
Asparagus aethiopicus, Sprengeri	Asparagus Fern	3
Macfadyena unguis-cati	Cat's Claw Vine	3
Silybum marianum	Variegated Thistle	Not Declared
Argemone ochroleuca and A Mexicana	Mexican Poppy	Not Declared
Eragrostis carvula	African Lovegrass	Not Declared
Datura species	Thornapple	Not Declared
Carthamus lanatus	Saffron Thistle	Not Declared
Acacia farnesiana	Mimosa	Not Declared
Eremophila maculata	Fuchsia Bush	Not Declared

Native species on properties within the MLA areas that have their growth or emergence currently controlled for maintaining or increasing grass cover, or for other purposes, will be managed with due regard to the species' status and the species contribution to regional ecosystems described under the *Nature Conservation Act 1992*, (NC Act), *Vegetation Management Act 1999* (VM Act) and *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act). Management of these native species will also consider the agricultural post-mining land use of the site.

The WJV aims to prevent the spread of parthenium and other noxious weeds as far as practicable through its weed management strategy, as has been the experience in other mines operated by XCQ. The key principles that will be adopted under the weed management strategy are listed below.

Vehicle weed washdown facilities

Vehicle washdown protocols will be implemented for all vehicles and equipment, this includes the requirement that all vehicles and equipment must be cleaned on entering the Project area. In addition vehicles and equipment that have been exposed to weed infestation areas will be cleaned on leaving the Project area. The washdown water from the washdown facilities shall be managed to ensure it does not enter creek, other waterways or gullies. Western Downs Regional Council is currently proposing the construction of a multi-user weed washdown facility at Wandoan. If constructed, this facility will support the Wandoan Coal Project, as well as other projects proposed or occurring in the region.

The construction of the washdown facility and the procedures adopted in its operation and management will be consistent with the DEEDI (formerly DPI&F) washdown/cleandown procedures located at http://www.dpi.qld.gov.au/cps/rde/dpi/hs.xsl/4790_7078_ENA_HTML.htm

Weed management planning

The WJV's strategy towards weeds present on site, including but not limited to parthenium, will firstly be containment, and secondly eradication where practical. Eradication would likely include a staged program over areas of the site over a number of years.

In order to minimise the impact and prevent the spread of declared plants, the following initiatives have been implemented and will apply throughout all stages of the Project:

- weed awareness and education program via induction and regular toolbox talks to WJV staff and contractors
- ongoing research into appropriate control strategies for declared plants
- ongoing consultation with stakeholders, including neighbours, government agencies, local authorities and weed control contractors
- accurate mapping of on-site, local and regional weed infestations
- vehicle washdown protocols (including Weed Hygiene Declaration) as per http://www.dpi.qld.gov.au/cps/rde/dpi/hs.xsl/4790_7075_ENA_HTML.htm) to ensure that all vehicles and equipment are inspected and cleared prior to entering or leaving the Project area
- ongoing monitoring to assess effectiveness of control strategies and to identify any weed outbreaks or control program shortfalls. This will include a formal annual review of parthenium areas and other identified weed areas as part of the annual review of the pest management procedure
- annual reviews of weed management strategies.

Weed control

Mapping of existing weed infestation has been and will continue to be undertaken to ensure containment of existing weeds within existing localised specific areas. In addition Landcare have provided a copy of their most recent weed mapping from 2006 to the WJV for use with existing mapping.

For any declared plant currently existing on site, or for any that are identified on site throughout the life of the Project, control methods generally consistent with those outlined in the relevant species Fact Sheet prepared by DEEDI (formerly DPI&F) will be adopted, in consultation with relevant stakeholders.

In the case of Parthenium weed, herbicide control involves a knockdown herbicide to kill plants that are present and a residual herbicide to control future germination. Timing of spraying is critical so that Parthenium weed is removed when plants are small and before seeding has occurred. The management procedure proposed for Parthenium weed is the combined application of Ally herbicide and Surpass 300 herbicide.

Where there is a risk of weed resistance to herbicide application, the WJV will use alternative control measures or different herbicides.

Pest management

Twelve species of introduced animals were recorded in the study area. Among these were five declared pest species listed under the *Land Protection (Pest and Stock Route Management) Act 2002* including the Feral Pig (*Sus scrofa*). These pest species are all listed under Class 2, which are pests that are established in Queensland and have, or could have, a substantial adverse economic, environmental or social impact.

As described in Volume 1 Chapter 17A Terrestrial Ecology, Section 17A.5.2, a pest management procedure including feral animal management will be developed for the Project and adapted throughout the Project operations.

Native species on properties within the MLA areas that may have population numbers currently controlled by any method for any purpose, will be managed with due regard to the species' status described under the *Nature Conservation Act 1992*, (NC Act), *Environment Protection and Biodiversity Conservation Act 1999* (Cwth) (EPBC Act), and any other relevant Acts, Regulations, plans or policies.

Declared animal (pest) management planning

In order to minimise the impact and prevent the spread or establishment of declared (and other pest) animal species on the Project site, the following initiatives will be undertaken throughout the life of the Project:

- pest awareness and education program via induction and regular toolbox talks to WJV staff and contractors
- ongoing research into, and implementation of, appropriate control strategies for declared (and other pest) animals
- ongoing consultation with stakeholders, including neighbours, government agencies and local authorities
- ongoing inspection and monitoring to assess effectiveness of control strategies and to identify any control program shortfalls
- appropriate waste management strategies including the provision of lids on bins containing food scraps
- annual reviews of pest management strategies.

Pest control strategies

For any declared animal species currently existing on site, or for any that are identified on site throughout the life of the Project, control methods generally consistent with those outlined in the relevant DEEDI species Fact Sheet will be adopted, in consultation with relevant stakeholders.

Trapping is currently the preferred control method to be adopted for feral cat control. All traps will be checked daily and trapped cats will be disposed of in a humane manner.

Where appropriate and in consultation with stakeholders, baiting with 1080 (sodium fluoroacetate) is considered the most effective primary control method for the following pest animals:

- feral pigs
- wild dogs
- foxes.

No feasible or effective pest control strategies have been identified for the remaining pest species that have previously been identified on the Project site.

17A.5.3 FURTHER SURVEY

The further terrestrial ecology survey undertaken for the gas supply pipeline, as presented in this chapter and associated addendum to the technical report STR 17A-1-SV1.5, were conducted to fulfil the requirements of the Terms of Reference for the Project, thereby providing seasonal survey of all components of the Project area.

Ongoing terrestrial ecology surveys will be undertaken as part of the biodiversity and land management plan throughout the life of the Project.

17A.6 RESIDUAL IMPACTS AND OFFSETS

Biodiversity offsets for the Project are considered below under the Policy for Vegetation Management Offsets (Department of Natural Resources and Water 2007), the draft policy for Biodiversity Offsets (Queensland Government 2008) and the Draft Policy Statement: Use of environmental offsets under the *Environment Protection and Biodiversity Conservation Act 1999* (Department of the Environmental and Water Resources 2007).

The WJV's detailed Biodiversity Offset Strategy will be developed in consultation with key stakeholders, including the Department of the Environment, Water, Heritage and the Arts (DEWHA); the Department of Environment and Resource Management (DERM, formerly EPA), and community groups.

Where Project development will result in impacts to previous rehabilitation activities that have been funded by Landcare and other groups, the environmental values established by these activities will be addressed in the design of the WJV's offset program to ensure there is a net improvement in ecological value.

The WJV's offset commitments also apply to relevant vegetation types within existing stock routes.

Fire management in the biodiversity offset areas, including bushfire control and ecological fires, will be managed through a bushfire management procedure as discussed in the Supplementary EIS Volume 1, Chapter 7 Climate.

17A.6.1 OFFSETS FOR IMPACTS ON MLA AREAS

Clearing of vegetation for mining activities on a mining lease is not an assessable development under the *Integrated Planning Act 1997* and therefore the Regional Vegetation Management Code and the Policy for Vegetation Management Offsets do not apply to vegetation clearing on the MLA areas, although the activities outside the mining lease are assessable.

Draft Queensland Government Policy on Biodiversity Offsets

As noted in section 17A.2.1, the Queensland Government has released a draft Policy for Biodiversity Offsets. Under this draft policy, the Coordinator-General, in consultation with DERM, may consider the appropriate offset requirements for 'significant projects', which may comprise an offset package and/or financial contribution. The draft policy considers offsets for endangered, vulnerable and rare species; endangered and of concern regional ecosystems; and remnant vegetation in subregions with less than 30% of remnant vegetation remaining. It is understood that this policy is currently being revised following consultation and submissions

17A.6.2 OFFSETS FOR IMPACTS ON GAS SUPPLY PIPELINE

Vegetation Management Act 1999

Offsets are an acceptable mechanism to meet the performance requirement of the Regional Vegetation Management Code (Department of Natural Resources and Water 2006) where the performance requirement includes maintaining the current extent of assessable vegetation. Offsets provided to meet the performance requirements should follow the Policy for Vegetation Management Offsets (Department of Natural Resources and Water 2007). Three of the performance requirements outlined in Section 17A.4.1 require offsets, as shown in Table 17A-4.

Table 17A-4: Proposed clearing requiring offsets to meet the performance requirements

Performance requirement	Regional Ecosystem(s)	Listed in Table 3*	Extent of clearing (ha)
PR S.3 Watercourses	11.3.25	No	0.2

* Table 3 of the Policy for Vegetation Management Offsets lists regional ecosystems that have a remnant extent below 5% of their preclearing extent and that are less than 500 hectares in total extent, or that have a remnant extent less than 200 hectares, or that are at risk of the remnant extent falling below 200 hectares. Different offsetting requirements apply to ecosystems listed in Table 3.

Clearing of remnant regional ecosystems as detailed in Table 17A-4 would require offsets that meet the following criteria:

- limitations on offset vegetation
- selection and location of appropriate regional ecosystem
- remnant mapping
- obtaining ecological equivalence
- ensuring ongoing management

- ensuring the offset is legally secured
- other requirements including ownership of land and financial contributions (Department of Natural Resources and Water 2007).

Details of the criteria are presented in the Policy for Vegetation Management Offsets (Department of Natural Resources and Water 2007). The minimum area of clearing to offset ratio will need to be determined following Table 2 of the Policy for Vegetation Management Offsets (Department of Natural Resources and Water 2007), up to a ratio of 4:1 depending on the location, habitat quality and ecosystem type of the offsets. Each performance requirement will need to be addressed completely, but a single offset may address more than one performance requirement.

Subject to determining the preferred power supply option, and further refinement of actual disturbance as calculated in the Project's detailed design, the WJV will ensure an offset to meet a 3:1 ratio for Project-related disturbance of protected vegetation, deemed by current legislation as requiring an offset on unavoidable impacts.

17A.6.3 OFFSETS UNDER THE EPBC ACT

Offsets under the EPBC Act may be required for impacts to matters of national environmental significance, including endangered ecological communities (Brigalow (*Acacia harpophylla* dominant and co-dominant)), semi-evergreen vine thicket, and threatened species (e.g. *Homopholis belsonii* and Brigalow Scaly-foot). The offsets should follow the principles outlined in the Draft Policy Statement: Use of environmental offsets under the *Environment Protection and Biodiversity Conservation Act 1999* (Department of the Environment and Water Resources 2007), and as described in the Supplementary EIS technical report STR 17A-1-SV1.5, Section 7.3.

Offsets required under the EPBC Act can generally overlap with those required to address state policies that is, the one offset site may address multiple offsetting requirements.

17A.6.4 WJV'S BIODIVERSITY OFFSET STRATEGY

As part of its Biodiversity Offset Strategy, the WJV commits to ensuring a biodiversity offset to meet a 3:1 ratio for Project-related disturbance of remnant endangered regional ecosystem vegetation (using biodiversity status) as well as endangered ecosystems listed under the EPBC Act. For the MLA areas, these unavoidable impacts include no more than the clearing of 40.7 ha of remnant endangered regional ecosystem vegetation, resulting in a biodiversity offset of approximately 122.1 ha. These figures will be refined as part of the Biodiversity Offset Strategy during the detailed design phase.

17A.7 CONCLUSIONS

A number of Threatened RE's, communities, species of plant and species of animal have been recorded in the MLA areas and gas supply pipeline study areas or are considered likely to occur (moderate or high likelihood), and may be affected by the Project.

Impacts on Threatened species and communities listed under the EPBC Act are required to be assessed following the *Principal Significant Impact Guidelines*. An assessment of the significance of the impact to State-listed REs and Threatened species was also undertaken.

The results of the summer (February 2009) survey of the gas supply pipeline or the modifications to the MLA areas did not significantly change the significance assessments for these communities and species as detailed in Volume 1 terrestrial ecology technical report TR17A-1-V1.5.

The summer (February 2009) ecological survey of the gas supply pipeline was undertaken to meet the requirement of the Project TOR for seasonal surveys in affected areas. Additionally, the modification to some of the mining pits and infrastructure within the MLA areas has required reassessment of the extent of vegetation clearing and the associated impacts.

Generally the vegetation types, habitat types and species present were the same as those recorded during the earlier surveys.

The clearing within the MLA areas and the gas supply pipeline alignment is likely to result in removal of 319.1 hectares of remnant vegetation, of which 27.6 hectares are listed as remnant endangered (DERM Biodiversity

Status), and 471.7 hectares of non remnant vegetation. The non remnant vegetation includes 13.1 hectares of EPBC-listed endangered ecological community (11.9.4). Overall this is a reduction in the extent of vegetation that was proposed to be cleared in the EIS. Other impacts and the proposed mitigation measures remain the same from the EIS Volume 1 Chapter 17A Terrestrial Ecology.

Overall, and consistent with the EIS, the impact assessments conclude that the Project is not likely to have a significant impact on threatened species or communities, nor will it interfere with their recovery, assuming suitable mitigation measures are put in place as outlined in Section 17A.6 of the EIS and Supplementary EIS.

17A.8 REFERENCES

Campbell, L.C. 1995, *A Report to ERM Mitchell McCotter on Coal Dust and Plant Growth*, The Faculty of Agriculture, University of Sydney, NSW.

Department of Natural Resources and Water 2006, *Regional Vegetation Management Code for Brigalow Belt and New England Tablelands Bioregions*, The State of Queensland (Department of Natural Resources and Water), Brisbane.

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Environmental Protection Agency 2002, *Biodiversity Planning Assessment: Brigalow Belt South Landscape Expert Panel Report*, Queensland Government, Brisbane.

Queensland Government 2009, *Policy for Biodiversity Offsets*, Consultation Draft, Environmental Protection Agency, Brisbane.