

**Statement of Environmental
Effects to Support Section 96
(2) Application to Modify
Development Consent DA 309-
11-2001-i**

November 2006

Ashton Coal Operations Pty Ltd



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1. Introduction

Parsons Brinckerhoff Australia (PB) has been engaged by Ashton Coal Operations Pty Ltd (hereafter referred to as Ashton Coal) to provide documentation to accompany an application under Section 96 (2) of the Environmental Planning and Assessments Act, 1979 (EP&A Act).

Ashton Coal operates the Ashton Coal Mine and associated coal handling and preparation facilities, which were granted development consent by the NSW Minister for Planning (DOP) on 11 October 2002 in response to development application DA 309-11-2001. On 27 January 2005 the Minister for Infrastructure and Planning provided consent to modify the development consent (DA 309-11-2001-i).

The offsite emplacement of Ashton Coal's coal tailings is required to provide tailings storage capacity during the period where the underground mine is producing concurrent to the open cut mine, prior to the "Barrett Pit" final void being available for tailing deposition.

Ashton Coal and Macquarie Generation have reached agreement to utilise Macquarie Generation's Ravensworth Final Void No: 4 East for the offsite emplacement of Ashton Coal's coal tailings.

The planning approvals pathway consists of submitting two Section 96 (2) applications to modify both Ashton Coal's DA 309-11-2001-i and Macquarie Generation's DA 144/93 development consents.

Emplacement of fly ash generated by Bayswater Power Station by Macquarie Generation in Ravensworth Void No: 4 was approved by Singleton Council via Development Consent DA 144/93 in December 1993. Separate Section 96 (2) application and Statement of Environmental Effects (SEE) documents have been submitted to Singleton Council seeking to modify DA 144/93 to allow the emplacement of coal tailings in place of fly ash.

This SEE details the potential environmental impacts and mitigation management strategies associated with modification of DA 309-11-2001-i to allow offsite emplacement of coal tailings and approval for pipelines associated with this offsite emplacement, rather than currently approved co-disposal of coal tailings at the Ashton Mine site. This SEE is accompanied by a separate S96 (2) report which documents the planing elements associated with the modification of DA 309-11-2001-i.

2. Proposed Modifications

This statement of environmental effects has been prepared to support a Section 96(2) application to modify Ashton Coal's existing development consent DA 309-11-2001-i to allow offsite emplacement of coal tailings and seek approval for pipelines associated with this offsite emplacement.

Where components of the modified proposal do not differ from the approved proposal they are not detailed within this document as they are considered to have been addressed as part of the original assessment.

This document only considers the components of the proposal modified from the approved proposal, potential environmental impacts of these modifications and environmental safeguards proposed to manage these potential environmental impacts. This documentation should provide sufficient information to allow assessment of the development modification.

The proposed modifications from the original proposal approved in DA 309-11-2001-i include:

- offsite emplacement of coal tailings in Ravensworth Final Void No. 4 East, rather than approved co-disposal at Ashton Mine site
- construction and operation of pipelines associated with offsite coal tailings emplacement

It should be noted that there is:

- no increase in the previously approved total volume of material to be deposited in Ravensworth Final Void No. 4
- no increase in the approved rate of coal extraction or processing at Ashton Coal

3. Alternatives considered

A number of alternatives were considered with respect to offsite emplacement of coal tailings from Ashton Coal's CHPP, pipeline route and creek crossing for this project.

3.1 Onsite/offsite coal tailings emplacement alternatives

Two alternatives were considered with respect to onsite or offsite emplacement of coal tailings from Ashton Coal's CHPP.

3.1.1 Alternative 1

The first alternative consisted of continuing to deposit tailings as per current operations, as described in the approved Ashton Coal EIS. This alternative was not preferred as:

- the region of the existing tailings treatment is programmed to be mined
- involves 'double handling' of materials

3.1.2 Alternative 2

The second alternative is the preferred and most feasible option for offsite emplacing coal tailings from Ashton Coal's CHPP. The benefits of relocating the tailings emplacement to Ravensworth Final Void No. 4 East include:

- confining this volume of tailings to a discrete area
- minimising noise impact
- minimising air quality impact
- minimising visual impact
- allowing water sharing between adjacent mines
- void will be rehabilitated
- avoids the need for a temporary emplacement area at Ashton whilst mining is occurring in the region of the existing tailings treatment area
- reduces the final height of the rehabilitated land at Ashton by transferring five million cubic metres of material to the Ravensworth void

Separate Section 96 (2) application and Statement of Environmental Effects (SEE) documents have been submitted to Singleton Council seeking to modify DA 144/93 to allow the emplacement of coal tailings in place of fly ash.

3.2 Pipelines alignment alternatives

The proposed pipelines alignment has been selected so as to minimise environmental impacts such as erosion, vegetation loss, and habitat destruction, whilst providing sufficient access for future operational and maintenance activities.

Four alternative pipelines alignments were considered (as illustrated in **Figure 3**). Essentially the alignment of all four alternatives are similar, however each alternative has been modified to provide improved environmental outcomes.

Each alternative and its merits are discussed below:

3.2.1 Alternative 1

The first pipelines alignment represents the most direct alignment considered.

This alignment was considered as it is a direct route to the Ravensworth Final Void No. 4 East and utilised the existing access track within Macquarie Generation owned land for both access and bunding purposes.

This alignment was discounted as it required clearing of native plantation and Casuarina Woodland and unnecessarily crossed to the western side of the existing access road within Macquarie Generation land. This alignment also impacted on items of potentially non-indigenous heritage significance.

3.2.2 Alternative 2

The second pipelines alignment represented a refinement of alternative 1, avoiding existing vegetation and removing the need to traverse to the western side of the existing access road.

This alignment was considered to be an improvement on alternative 1 as it negated the need to clear existing native plantation and Casuarina Woodland and the unnecessary crossing of the existing access road.

The alignment was discounted as it directly impacted on items of potentially non-indigenous heritage significance.

3.2.3 Alternative 3

Alternative 3 is an improvement on alternatives 1 and 2. Alternative 3 avoids the potential items of non-indigenous heritage significance and better utilises the existing access track within Macquarie Generation owned land.

This alignment is an improvement on alternatives 1 and 2 as it avoids the need to clear existing native plantation and Casuarina Woodland, does not impact on the old farm buildings and maximises use of existing access roads.

The alignment was discounted due to the single discharge point into the Ravensworth Final Void No. 4 East.

3.2.4 Alternative 4

Alternative 4, the preferred alternative is generally the same alignment as alternative 3, however it utilises a multi point ring main distribution configuration located around the perimeter of the Ravensworth Final Void No. 4 East. The ring main configuration allows greater control over the discharge and beaching of tailings into the Ravensworth Final Void No. 4 East.

This alternative has been selected as the preferred option as it maximises environmental and engineering outcomes.

3.3 Bowmans Creek crossing alternatives

Five alternatives were considered for the crossing at three locations on Bowmans Creek (as illustrated in **Figure 3**). Each alternative and its merits are discussed below:

3.3.1 Alternative 1

The first alternative consists of laying double-sleeved pipe on the bed of Bowman's Creek.

This alternative was considered satisfactory in the early stages of scoping the project as there was to be only two pipelines, one tailings pipeline and a decant water return pipeline. This alternative presented minimal disruption and environmental impact to the creek as soils would not be excavated or disturbed.

Given that the design now incorporates five pipelines (four with a significant sleeve) the laying of these pipelines on the creek bed is not considered feasible. The crossing alternative also presents potential hazards in the event of flooding.

3.3.2 Alternative 2

This alternative consists of fixing the pipelines to the New England Highway Bridge over Bowmans Creek. Whilst this alternative presents improved environmental outcomes in terms of aquatic flora and fauna and stream flows, preliminary consultation with the Roads and Traffic Authority indicated that authorisation would not be provided to fix the pipe work to the New England Highway Bridge.

3.3.3 Alternative 3

This alternative consists of a pipe bridge was proposed immediately west of the New England Highway Bridge over Bowmans Creek. This option was discounted, as the visual impact to passing motorist was significant and the construction of support structures on either bank would have major impact on existing vegetation.

3.3.4 Alternative 4

This alternative consists of a pipe bridge was proposed approximately 100m east of the New England Highway Bridge over Bowmans Creek. This option was discounted, as the visual impact to passing motorist was still significant and the construction of support structures on either bank would have a greater impact on existing vegetation.

3.3.5 Alternative 5

This alternative is the preferred and most feasible option to traverse Bowmans Creek as it maximises environmental and engineering outcomes.

This alternative includes trenching through the bed of Bowmans Creek in an area previously cleared of vegetation for the recent installation a Telstra cable. The trench will continue along the northern bank of Bowmans Creek until it passes under the New England Highway

Bridge. Each of the pipelines will be double sleeved to capture potential spills that may occur from pipeline breakages.

The pipelines will be trenched to a depth of approximately 1.5m.

Pipes located in the northern bank of Bowmans Creek shall be located in a sand bed with excavated topsoil materials reinstated following commissioning.

Once positioned the pipelines at the creek crossing will be encased in a 600mm layer of concrete, backfilled/compacted with natural material and capped with aggregate of up to approximately 250mm in diameter for a depth of 300mm. The aggregate layer covering the pipelines will be engineered to ensure a finished level consistent with the existing creek bed.

4. Potential Environmental Impacts and Safeguards

The following sections considers existing environmental issues, components of the proposal modified from the approved proposal, potential environmental impacts of these modifications and environmental safeguards proposed to manage these potential environmental impacts.

Summaries of relevant information relating to existing environmental issues have been extracted from relevant Environmental Impact Statements and are provided within the following sections. More detailed information of the existing environmental issues at the emplacement area is available by reviewing relevant sections within the *Bayswater Power Station Fly Ash Disposal in Ravensworth No. 2 Mine Void and Mine Rehabilitation* Environmental Impact Statement prepared by Pacific Power in 1993.

4.1 Land use

The alignment of the proposed pipelines consists of highly disturbed land as a result of past and current mine use.

The pipelines alignment is located on land currently owned by Ashton Coal and Macquarie Generation. This land largely consists of underground and open cut mining operations, power stations and rehabilitation areas.

The land north of land formally known as Brunkers Lane is highly disturbed and consists predominately of overburden from previous open cut mining operations. The land to the south of land formally known as Brunkers Lane is also disturbed from previous agricultural activities.

No non-mine owned residences are located within 2km of the proposed pipelines or emplacement area. The Ashton EIS describes the village of Camberwell as being located approximately 1.5 km east of the mine surface facilities, which is approximately 2km from the southern extent of the pipelines.

Newpac No. 1 Colliery and Ashton Coal's approved underground operations underlie a portion of the pipelines alignment.

The proposed land use, following the proposed modifications, is consistent with that of the original consent.

4.2 Geology and soils

4.2.1 Geology

The geology underlying the proposed pipelines alignment comprises of the Quaternary and Singleton Coal Measures (Singleton 1:250,000 Geological Series Sheet SI 56-1, First Edition, 1969).

4.2.2 Soils

The pipelines alignment is located within the Bayswater, Hunter and Liddell soil landscapes, as mapped by the Soil Conservation Service of NSW (Singleton Soil Landscape Sheet SI 56-1, 1983).

The soils underlying the pipelines alignment are described below:

- *Bayswater (bz)* – These soils exist within a small portion of the proposed pipeline alignment. The soils consist of Permian sandstone, shale, mudstone, conglomerate and coal. Yellow Solodic Soils are dominant on slopes with alluvial soils in drainage lines and are considered to be vulnerable to sheet and gully erosion on common slopes. The Ashton Coal Project EIS advises that these soils have a high hazard and salinity rating and a high to extreme erosion rating.
- *Hunter (hu)* – Soils of this group are traversed by the proposed pipelines and consist primarily of Brown Clays and Black Earths on former stream channels and tributary flats. Red Podsollic Soils and Lateric Podsollic Soils are located on older terraces. These soils may seasonally crack or crust under cultivation and have a high risk of structural degradation and erosion.
- *Liddell (ld)* - These soils underlie the north-west section of the proposed pipeline alignment. This group consists of Permian sandstone, shale, mudstone, conglomerate and coal. Yellow Soloths and Yellow Solodic Soils dominate slope stratum and Earthy and Siliceous Sands are found on slopes of siliceous parent rock. Red Soloths, Red Solodics and Red Podzolic Soils also exist in small quantities within the group.

The NSW Department of Natural Resources (previously the NSW Department of Land and Water Conservation) has developed a land classification system referred to as land capabilities for evaluating rural land. The classification system is based on an assessment of the biophysical characteristics of the land and the extent to which these characteristics will limit a particular type of land use.

Land capability mapping of the land traversed by the proposed pipeline alignment was undertaken between 1986 – 1989. Three classes of land will be traversed:

- *land capability class IV grazing, occasional cultivation* – is land considered not suitable for cultivation on a regular basis due to limitation of slope gradient, soil erosion, shallowness or rockiness, climate or a combination of these factors. This class of land comprises of the better classes of grazing land and can be cultivated for the occasional crop, or for pasture renewal.

Approximately 1 kilometre of the pipeline located immediately south of land formally known as Brunkers Lane to the southern side of Bowmans Creek crosses this land class.

- *land capability class V grazing, occasional cultivation* – is land considered not suitable for cultivation on a regular basis due to limitation of slope gradient, soil erosion, shallowness or rockiness, climate or a combination of these factors. Soil erosion problems are often severe. Production is generally lower than for grazing lands in Class IV and can be cultivated for an occasional crop, particularly fodder crop or for pasture renewal.

The southern section of the pipeline south of Bowmans Creek to Ashton Coal CHPP is classified as class V land. The section of the pipeline north of land formally known as

Brunkers Lane for approximately 1.5 kilometres is also classified as class V land. This classification is now considered to be inappropriate as this section of land has been subject to open cut mining since the 1989 classification and now comprises of overburden materials which might be more appropriately classed as ‘*other*’ (mining and quarrying areas).

- *Other (mining and quarrying areas)* – is land unusable for agricultural or pastoral uses. Recommended uses are those compatible with the preservation of natural vegetation.

The northern section of the pipeline including the emplacement area traverses land classified as ‘*other*’.

4.2.3 Potential Impacts and Safeguards

As the proposed modification requires soil disturbance, potential erosion and sedimentation impacts may occur. These effects will be managed through the implementation of environmental safeguards. The potential environmental impacts and safeguards are detailed in **Table 1**.

Table 1 Erosion impacts and environmental safeguards

Impact of Proposed Modifications	Environmental Safeguards
Soil erosion and surface water sedimentation	<p>Sedimentation fences will be placed down slope of work areas subject to disturbance</p> <p>All erosion/sedimentation control devices will be regularly inspected and maintained to ensure effectiveness for the duration of the construction or maintenance works</p> <p>Areas of disturbance will be minimised at all times</p> <p>Earthen bunds to be revegetated progressively</p>
Soil erosion at Bowmans Creek Pipelines Crossing	<p>Pipelines installed at a depth of approximately 1.5m</p> <p>Pipelines concrete encased</p> <p>Natural aggregate provided at creek bed</p> <p>Level of aggregate flush with existing creek bed level</p> <p>Trenching will be carried out when flow is minimal or creek is dry</p>

The potential erosion and sedimentation impacts and safeguards are consistent with that of the original consent.

4.3 Ground and surface water

4.3.1 Surface water

The proposed pipelines alignment traverses Bowmans Creek, a tributary of the Hunter River, which has a total catchment area of approximately 260km². The Hunter River Catchment is predominately cleared and utilised for mining, grazing and other agricultural land uses.

Bowmans Creek flows from the north-east, underneath the New England Highway, intersecting the proposed pipeline alignment approximately 120 metres from the Ashton Coal CHPP.

Bowmans Creek is generally considered perennial, however as is currently the case, flow ceases during extreme periods of drought.

The water quality of Bowmans Creek has been subject to considerable investigation as part of the EIS prepared for the Ashton Coal Project. The results of water sampling analysis from 1999 – 2001 indicates that the water quality of Bowmans Creek exceeds the ANZECC 2000 water quality guidelines for both pH and electrical conductivity.

4.3.2 Groundwater

According to the NSW Water Information database, a number of groundwater bores exist within a 2.5 kilometre radius of the Ravensworth Final Void No. 4 East emplacement area. The depth of these bores ranges from 4.6 – 16.2 metres.

There are currently no known extractions of groundwater from the Singleton Coal Measures or the Bowmans alluvial within the study site. The salinity of the existing groundwater is high and therefore of limited agricultural use.

4.3.3 Potential Impacts and Safeguards

The construction of the pipelines will involve the utilisation of a number of vehicles and mobile equipment. The use of lubrication and hydraulic oils, along with diesel fuel with these vehicles and mobile equipment has the potential for spills.

The construction of the earthen bunds on each side of the pipelines will involve the placement of previously disturbed overburden materials. Given the potentially erosive nature of this overburden material, specific erosion and sedimentation safeguards will be implemented prior to completion of rehabilitation.

The proposed pipelines will be trenched through Bowmans Creek, creating the potential for increased turbidity. However, in order to minimise potential impacts the creek will be trenched during periods of minimal or no flow. Any turbidity generated following the resumption of flow in the creek after trenching will be the equivalent of a first flush.

The majority of the pipelines transport “mine water”. The operation of any pipeline has the potential for leakage. The length of the pipelines alignment is contained, either within earthen bunds or external sleeves.

The flow rate of water through the pipelines is continuously monitored from the control room at Ashton Coal. Any differential in flow rates activates a “Potential Leakage” alarm.

Contractors responsible for emergency services such as pipeline repairs and spill clean up will be established prior to operation.

Minimising the potential for surface water impacts minimises the opportunity for these impacts to infiltrate local ground water.

Surface and ground water quality will be maintained through the implementation of environmental safeguards. The potential environmental impacts and environmental safeguards to be implemented are summarised in **Table 2**.

Table 2 Water quality impacts and environmental safeguards

Impact of Proposed Modifications	Environmental Safeguards
Water pollution of from the runoff of fuels and oils from construction equipment	Linear silt fencing and straw bales will be placed down slope of ground of ground disturbance to prevent erosion Chemical spill kits available during all site works
Potential leakage of mine water from pipelines	Provision of earthen bunds or sleeves for containment of potential spills Spillage/leakage detection through continuous flow monitoring Establish contractors responsible for emergency services such as pipeline repairs and spill clean up
Erosion and sedimentation as a result of soil disturbance	Upslope surface runoff will be diverted around working areas to prevent erosion Silt fencing around stockpile material Minimise disturbed area at any given time Progressive rehabilitation of disturbed areas
Increased turbidity of Bowmans Creek from trenching activities.	Trenching will be carried out when flow is minimal or creek is dry

The potential surface and ground water impacts are related, however the environmental safeguards proposed for the modified proposal should provide an outcome which is consistent with that of the original consent.

4.4 Heritage

In July 2005 Insite Heritage Pty Ltd were commissioned by Parsons Brinckerhoff to assess the need for a full archaeological assessment of the proposed pipelines alternative alignment 1 outside of the Ashton Coal Project EIS study boundary.

The proposed pipeline alignment will be constructed in an area heavily disturbed by previous mining and agricultural activities. A full archaeological assessment was not considered necessary.

Following a number of alignment changes to provide improved flora and fauna outcomes, a further assessment of the proposed pipelines alternative alignment 4 was undertaken by Insite Heritage Pty Ltd in May 2006.

No sites of Aboriginal significance were identified within the footprint of the proposed pipelines, outside of the Ashton Coal Project EIS study boundary.

As part of the Ashton Coal Project EIS an assessment of Aboriginal archaeology was undertaken by HLA Envirosciences in June 2001. Twenty four sites were identified within the mine lease area bordered by Bowmans Creek, the New England Highway and the Northern Railway (i.e. east of the New England Highway Bridge).

On the 21st July 2003 Ashton Coal received approval, under Section 90 of the *National Parks and Wildlife Act, 1974*, to destroy and collect the Aboriginal objects within this area. A total of 167 Aboriginal artefacts were recovered and provided to the Wonnarua Local Aboriginal Land Council for care and control.

4.4.1 Potential Impacts and Safeguards

In the unlikely event that items of potential indigenous significance are identified all works within the vicinity will cease and DEC (NPWS) will be notified. No artefacts will be disturbed until the appropriate consents have been obtained.

The Archaeological Assessment and its findings are presented in **Appendix A**.

Table 3 Archaeological impacts and environmental safeguards

Impact of Proposed Modifications	Environmental Safeguards
Impact on indigenous artefacts through disturbance to soils	Where a suspected indigenous artefact is discovered, works within the vicinity shall cease and DEC (NPWS) will be contacted immediately.

The potential heritage impacts and safeguards are consistent with that of the original consent.

4.5 Flora and fauna

A preliminary flora and fauna assessment of alternative pipelines alignment 1 was undertaken by PB in July 2005. This assessment included both the tailings pipelines alignment and emplacement area. A further detailed assessment (including alternative pipeline alignment 4) was undertaken in May 2006. The results of both assessments were documented in a Flora and Fauna Assessment attached as **Appendix B**.

The purpose of the assessment was to determine the existing natural environment and likely impacts of the proposal on vegetation and animals, in particular Threatened species, populations, and communities listed under the *Threatened Species Conservation Act 1995* and the *Environment Protection and Biodiversity Conservation Act 1999*.

The following section is a summary of the assessment relevant to the area containing the proposed pipelines alignment:

The majority of the pipelines alignment has been cleared and significantly modified by past and current mining activities and consisted mainly of introduced grassland. Some small patches of native plantation and regrowth Casuarina Woodland occur along the pipeline alignment. The creek is bounded by Riparian Woodland (Hunter Valley River Oak Forest). The location of these communities is illustrated in **Figure 1 of Appendix B**.

The cleared area of the pipelines alignment provide limited habitat for fauna as it does not contain any significant habitat features such as ground cover vegetation, leaf litter, fallen timber for shelter and protection from predators; or isolated paddock trees with hollows for roosting or nesting. These cleared areas were classified as having poor habitat values.

Small fragments of Casuarina Woodland and native plantations were located adjacent to the northern portion of the pipelines alignment. These areas were highly fragmented and did not play a significant role in a wider corridor network.

The vegetation identified within the study area did not correspond to any Endangered Ecological Community.

While two Endangered Populations are listed under Schedule 1 Part 2 of the *Threatened Species Conservation Act 1995* in the Singleton Council Local Government Area, neither of these populations was observed or are considered likely to occur within the study site.

Review of the DEC Atlas of NSW Wildlife within the Singleton Local Government Area identified sixteen species of threatened plant or their habitats that have been recorded previously within the vicinity of the study site. No threatened species of plant or endangered populations was recorded within the study area and due to the highly modified environment; no threatened species of plant is likely to occur.

A total of 54 Threatened faunal species have been recorded or have the potential to occur in the study site, comprising eight species of amphibian, one species of reptile, 22 species of bird and nineteen species of mammal. No Threatened fauna species were recorded during field surveys.

Critical Habitat is listed under both the *Threatened Species Conservation Act 1995* and *Environment Protection and Biodiversity Conservation Act 1999*. No critical habitat was recorded in the study area.

Although the site is highly disturbed, it is likely to provide marginal habitat for Grey-crowned Babbler, and marginal foraging habitat for Masked Owl and four microchiropteran species of bat (Greater Broad-nosed Bat, Large-eared Pied Bat, Little Bent-wing Bat and Eastern Freetail Bat). Grey-crowned Babbler is conspicuous and no evidence of this species was recorded in the site. Hollow-bearing trees that provide roosting habitats for microchiropteran bats were also absent. As such, these species are considered unlikely to occur within the site.

4.5.1 Potential Impacts and Safeguards

Overall, the impacts associated within construction are likely to be minor as areas of native vegetation have been largely avoided. Due to the proximity of the site to existing mining activities, it is considered that the impacts of construction and operational noise on animals would be negligible. Due to the dominance of weeds within the site, construction has the potential to aid weed seed dispersal, particularly outside of the emplacement area footprint.

No endangered ecological communities, populations, or species were recorded within the site. Although the site is highly disturbed and modified, it would possibly provide marginal foraging for six Threatened species of animal (Grey-crowned Babbler, Masked Owl, Greater Broad-nosed Bat, Large-eared Pied Bat, Little Bent-wing Bat and Eastern Freetail Bat). The emplacement area avoid woodland and native plantation and despite the existence of records in the locality or the occurrence of predicted habitat, none of the Threatened species are considered likely to be significantly affected by the proposed upgrade activities for one or more of the following reasons:

- core habitats were not recorded in the study area
- the area is outside the normal range of the species and records are likely to be of vagrants or invalid
- the species is considered locally extinct
- resources used by the species are unlikely to be adversely affected, or only likely to be minimally affected by the proposal.

Given the disturbed nature of vegetation and habitats on site it is unlikely that the proposal would impact Threatened species, populations or communities.

The potential environmental impacts and proposed safeguards are presented in **Table 4**.

Table 4 Flora and Fauna impacts and environmental safeguards

Impact of Proposed Modifications	Environmental Safeguards
Potential spread of weeds through vehicle offsite movements	Vehicles to be inspected prior to entry and removal from the site. Any seeds identified are to removed and disposed in an appropriate manner

The potential flora and fauna impacts and safeguards are consistent with that of the original consent.

4.6 Traffic and transportation

The proposed pipeline alignment will traverse the New England Highway and land formally known as Brunkers Lane.

The proposed pipeline alignment has been designed to minimise potential traffic disturbances during construction and operational phases.

The New England Highway Bridge is located to the west of the Ashton Coal’s CHPP, where the highway passes over Bowmans Creek. The proposed pipeline will be trenched through the bed of the Bowmans Creek and the north bank of Bowmans Creek, passing under the New England Highway Bridge, therefore preventing disturbance to traffic on the New England Highway during the construction, operation and maintenance of the pipelines.

The pipelines will also traverse land formally known as Brunkers Lane. The pipelines will be trenched through land formally known as Brunkers Lane and placed in sleeves. This is generally an unsealed, formal road which experiences negligible traffic volumes and traffic impacts are expected to be minimal.

Traffic volumes generated by the proposal during the construction, operation and maintenance phase of the pipeline are expected to be negligible.

Construction of the pipelines will involve the utilisation of semi-trailers for transporting materials, utility vehicles, crane and various items of earthmoving equipment. Activities associated with the pipeline construction are expected to take up to 2 months.

During construction, operation and maintenance, access to the site will be facilitated through land formally known as Brunkers Lane. Formal access roads will not be constructed as part of the proposal. Access to the pipelines alignment for construction operation and maintenance activities will be via existing tracks and access roads.

The potential effects to traffic and mitigation measures associated with the proposal are presented in **Table 5**.

Table 5 Traffic impacts and environmental safeguards

Impact of Proposed Modifications	Environmental Safeguards
Site access	No formal roads will be constructed as part of the modified proposal. Access will be provided via existing tracks and access roads

The potential traffic impacts and safeguards are consistent with that of the original consent.

4.7 Air Quality

Activities associated with the construction the pipelines is not expected to adversely alter existing local or regional air quality in the long term.

No non-mine owned residences are located within 2km of the emplacement area. The Ashton EIS describes the village of Camberwell as being located approximately 4 kilometres south east of the emplacement area.

An air quality assessment of the proposed Ashton Coal undertaken by Holmes Air Sciences (October 2001) found that air quality within the region is currently within acceptable levels in terms of Total Suspended Solids (TSP) and Particulate Matter (PM₁₀).

The existing air quality in the region is consistent with that of mining, power generation and agricultural activities.

4.7.1 Potential Construction Impacts

Construction of the pipelines and associated earthen containment bunds has the potential to generate dust which may possibly impact on regional or local air quality in the short term.

Whilst the design of the pipeline integrates minimal disturbance to soils for environmental and social reasons, some soils will be disturbed during construction. Materials extracted from the overburden re-win pit will be used to construct the earthen bunds along the northern section of the pipeline.

Soils will also be disturbed in the vicinity of Bowmans Creek. The pipeline will be trenched through Bowmans Creek.

The use of existing access tracks by vehicles and equipment within the subject site also has the potential to generate dust during construction.

Emissions from plant and equipment during construction of the pipelines are expected to be minimal. It is anticipated that potential impacts on air quality from construction can be managed through the implementation of appropriate safeguards as outlined in **Table 6**.

4.7.2 Potential Operations and Maintenance Impacts

Air quality impacts of operational and maintenance activities are expected to be minimal.

Vehicles undertaking regular inspections and other maintenance activities during the operation of the pipelines and emplacement area have the potential to generate dust and impact on air quality. As access tracks will only regularly be utilised by a single vehicle (to undertake inspections) the potential for air quality impacts are negligible and are not expected to impact significantly on local or regional air quality.

The expected air quality impacts and mitigation measures for the proposed pipelines construction and emplacement of coal tailings into the Ravensworth Final Void No. 4 East are described in **Table 6**.

Table 6 Air quality impacts and environmental safeguards

Impact of Proposed Modifications	Environmental Safeguards
Construction of the earthen containment bunds	Exposed areas will be kept to a minimum Where required a water cart will be used to suppress dust generation Bunds will be progressively vegetated and stabilised as soon as practically possible following their construction
Dust generation as a result of construction vehicle movements	Vehicles will be restricted to formed roads and tracks, when possible Vehicle travel speeds will be reduced on unsealed roads and tracks Roads and tracks will be watered, as required
Emissions from vehicles and machinery during construction and maintenance works	Vehicles and machinery will be switched off during use to avoid unnecessary emissions Vehicles regularly maintained
Dust generation as a result of operation and maintenance vehicle movements	Vehicles will be restricted to formed roads and tracks where possible Vehicle speeds will be reduced on unsealed roads and tracks

The potential air quality impacts and safeguards are consistent with that of the original consent.

4.8 Noise

Noise impacts associated with the construction and operation of the pipelines at the Ravensworth Final Void No. 4 East have been considered.

No non-mine owned residences are located within 2km of the pipelines or emplacement area. The Ashton EIS describes the village of Camberwell as being located approximately 4 kilometres south east of the emplacement area.

Current sources of background noise within the vicinity of the site are predominately associated with nearby mining activities and traffic noise associated with New England Highway.

The acoustical environment of the local area during daytime, evening and night time has been extensively assessed within the Ashton Coal Project EIS. The results indicate the values of ambient day time noise levels prior to the development of the Ashton Coal Project ranged between 33 and 60 dB(A).

4.8.1 Potential Construction Noise Issues

Construction of the pipelines is expected to take approximately 2 months to complete. Construction is expected to be completed by early 2007.

Construction will generally be undertaken in accordance with Ashton Coal’s approved operations.

Sources of construction noise are likely to include:

- generators
- various power tools
- various light vehicles
- deliveries of construction equipment and materials

4.8.2 Potential Operational and Maintenance Noise Impacts

Operational noise associated with the pipelines is expected to be low. The primary source of noise during the operation of the pipelines will be four wheel drive vehicles undertaking regular inspections of accessible portions of the pipelines.

When required, sources of maintenance noise are likely to include

- generators
- various power tools
- various light vehicles
- deliveries of maintenance equipment and materials

The potential environmental impacts and proposed safeguards are presented in **Table 7**.

Table 7 Noise impacts and environmental safeguards

Impact of Proposed Modifications	Environmental Safeguards
Vehicle and machinery noise during construction and maintenance	<p>Any generators/equipment used on site during construction and maintenance will be equipped with noise attenuator casing and exhaust and maintained in accordance with manufacturers specifications</p> <p>All onsite work will be undertaken in accordance with the NSW Environmental Protection Agencies (EPA) Environmental Noise Control Manual, 1994</p>

The noise impacts and safeguards are consistent with that of the original consent.

4.9 Waste management

Waste produced during pipelines construction will predominately consist of surplus construction materials. All wastes will be removed from the site and recycled or disposed of at an appropriate waste management facility.

The impacts and safeguards associated with waste management are consistent with that of the original consent.

4.10 Visual impacts

The proposed pipelines are generally located within land impacted by existing and past coal mining operations. The proposed pipelines are consistent with surrounding land uses and are not expected to significantly alter and impact visual amenity. Further to this, three of the

five pipelines (coal tailings and decant water) will be decommissioned and removed following completion of tailings emplacement.

The proposed pipelines will traverse approximately 5 kilometres of land and will be approximately 6 metres wide (inclusive of earthen containment bunds) and 500mm in height. Existing vegetation screens the majority of the pipelines alignment from the New England Highway and occupants on the Singleton to Muswellbrook train service. However, the pipelines will be visible for limited glimpses along the highway and train service, particularly in the southern section of the pipeline alignment, were no vegetative screen exists.

The construction of vegetated earthen bunds and dark coloration of the piping should minimise any loss of visual amenity within the site. Construction of the pipelines will be confined to daylight hours.

Over the length of the proposed pipeline alignment, a number of natural drainage basins will be utilised in the event of leakages. Where natural surfaces are not available, vegetated basins will be constructed from fill sourced from the overburden re-win pit south of the Ravensworth Final Void No. 4 East.

The pipelines will not be visible from the village of Camberwell.

The visual impact of the proposed modification will be minimal and limited to brief glimpses by persons travelling along the New England Highway or Singleton to Muswellbrook bound rail passengers.

Table 8 below outlines the potential visual impacts and mitigation measures associated with the proposal.

Table 8 Visual impacts and environmental safeguards

Impact of Proposed Modifications	Environmental Safeguards
Exposure of the pipelines to neighbouring residencies and commuters on the New England Highway and train occupants on the Singleton to Muswellbrook train service	The pipelines are black in colour and enclosed by vegetated earthen bunds to minimise loss of visual amenity

The potential visual impacts and safeguards are consistent with that of the original consent.

4.11 Socio-economic impacts

Construction of the emplacement area and associated infrastructure is likely to inject approximately \$8 – 9 million into the local and regional economy.

The proposed pipelines construction is not expected to impact significantly on the socio-economic environment of the Singleton LGA and its surrounds.

Construction of the pipelines and emplacement area is likely to generate 15-20 short term construction jobs for a period of approximately five months. No long term permanent jobs will be created from the operation of the emplacement area.

The potential socio-economic impacts are marginally improved from that of the original consent.

4.12 Health of people

The health of surrounding communities will not be affected during the undertaking of pipeline construction, maintenance and operational activities. Dust generation is expected to be restricted to the initial constructional phase. The potential for dust generation is expected to be minimal in comparison to surrounding mining activities.

The potential healths of people risks are consistent with that of the original consent.

4.13 Hazards

Potential hazards associated with the pipelines include subsidence and spontaneous combustion. The pipelines have been designed to accommodate these potential hazards. These design considerations are discussed in further detail below.

4.13.1 Subsidence

A significant section of the proposed tailings pipeline alignment is underlain by the Newpac underground coal mine. This mine utilises longwall mining, approximately 180 to 350 metres below ground surface. The location of the pipeline alignment and the proposed Newpac longwall workings are illustrated in **Figure 2**.

The proposed pipelines will be aligned at ground level and will be constructed of HDPE polyethylene piping. This piping is flexible and has been designed to withstand the predicted impacts of subsidence. The design of all pipelines will allow for the subsidence effects of both Newpac and Ashton Coal's underground operations.

A subsidence monitoring regime will be undertaken within the Newpac colliery region and regular visual inspections of the pipelines will be undertaken. **Table 9** below outlines the potential subsidence mitigation measures associated with the proposal.

Table 9 Subsidence impacts and environmental safeguards

Impact of Proposed Modifications	Environmental Safeguards
Pipeline rupture along alignment	<ul style="list-style-type: none"> use of flexible HDPE piping use of pipe-in-pipe arrangement in southern section of the pipeline and construction of earthen bunds along the northern section of the pipeline to capture potential spill resulting from pipeline rupture regular visual inspection of the pipeline continuous monitoring

The potential subsidence issues and safeguards are consistent with that of the original consent.

4.13.2 Spontaneous combustion

Spontaneous combustion of coal and carbonaceous rocks is caused by the oxidation of coal substances and the resultant accumulation of heat. Ignition of the carbonaceous material

may occur when heat generates faster than it can be dissipated by natural cooling methods including conduction, convection and radiation and temperatures rises to the point of ignition.

The potential of coal to spontaneously combust depends on factors such as the rank of coal, sulphur content, particle size and moisture content. Spontaneous combustion also relies on access to a steady supply of oxygen.

According to the *Ravensworth Waste Management Centre EIS* prepared by HLA Envirosciences in March 2000, the spoils surrounding Ravensworth Final Void No. 4 East contain pockets of coal and carbonaceous shales, which resulted from the discarding of thin low quality seams and splits during mining. A number of areas surrounding pipelines alignment have been identified as areas of high temperature which could indicate site of actual or potential combustion.

The effects of high temperature on the HDPE pipeline material, due to spontaneous combustion, could potentially lead to leakage and spillage of tailings, decant or clean water. Regular inspections of accessible portions of the pipelines alignment will identify obvious areas of spontaneous combustion.

Table 10 below outlines the potential spontaneous combustion mitigation measures associated with the proposal.

Table 10 Spontaneous combustion impacts and environmental safeguards

Impact of Proposed Modifications	Environmental Safeguards
Spontaneous combustion of spoil leading to a leak and spill	regular visual inspection of the pipeline

The potential spontaneous combustion impacts and safeguards are consistent with that of the original consent.

4.13.3 Flooding

During major flooding events, levels in the Hunter River surge, causing the inundation of land within areas surrounding Bowmans Creek. This backwater effect last occurred in 1955, which is considered to be a 1 in 100 year event.

Within the Ashton Coal Project EIS, data from past flooding events was used to predict future peak flow levels and areas of inundation.

Hydrological modelling based on the combined flooding of Bowmans Creek and the Hunter River suggests that the majority of the pipeline route will remain unaffected during a 5, 20 or 100 year flood event. Surface drainage within the flood prone land is expected to drain naturally to Bowmans Creek.

Approximately 900 metres of the proposed pipeline traverses land predicted to be affected by 5, 20 and 100 year flood events. This section of pipeline commences within Ashton Coal's bund adjacent to the CHPP and just north of where the pipeline passes under the New England Highway Bridge. Predicted peak flood levels for this area range from 68.2m to 68.7m AHD for a 100 year flood event.

The pipeline southeast of the New England Highway Bridge will be pipe-in-pipe configuration. These pipelines will be trenched through the bed and north bank of Bowmans Creek. Placing the pipework belowground ensures it will not float during periods of flooding.

The pipeline system has been designed to reduce flooding impacts at Ashton Coal Mine site. Excess water generated during a flooding event will be pumped from Ashton Coal’s CHPP via the three of the four pipelines to Ravensworth Final Void No. 4 East.

Table 11 below outlines the potential flooding mitigation measures associated with the proposal.

Table 11 Flooding impacts and environmental safeguards

Impact of Proposed Works	Environmental Safeguards
Rupture of pipeline from floating in the event of a flood.	Pipework located with in belowground sleeve in areas affected by up to a 100 year flood event

4.14 Service utilities

The following utilities were contacted to establish utilities located within or adjacent to the emplacement area:

- Telstra
- PowerTel
- EnergyAustralia
- Newpac PED

4.14.1 Telstra

Telstra provided plans (22 May 2006) illustrates that one section of the proposed pipelines alignment is located in close proximity to underground Telstra fibre optic cables. This section is located within the Ashton Coal Mine and Bowmans Creek Crossing area. The remaining length of the pipeline is not located on or adjacent to any Telstra utilities.

Telstra have advised that relevant guidelines must be adhered to when heavy vehicle works are undertaken in proximity to existing Telstra infrastructure.

4.14.2 PowerTel

A ‘dial before you dig’ search has indicated that PowerTel cables exist within the vicinity of the proposed pipelines alignment. PowerTel provided drawings (22 May 2006) illustrates that underground fibre optic cables exist within the section of the proposed pipelines alignment that traverses and runs adjacent to the New England Highway, before reaching land formally known as Brunkers Lane.

PowerTel have requested that no heavy machinery is to be used within 1 metre of their cables. Although no soil excavation is anticipated within the vicinity of the cables, PowerTel will be contacted prior to the commencement of works involving the operation of heavy machinery, within the vicinity of the identified cables.

4.14.3 Energy Australia

Energy Australia has advised that no underground cables exist in proximity to the pipelines alignment. Although no known utilities have been identified, Energy Australia have advised that caution is still required during all works involving heavy machinery.

An existing above ground power transmission line exists within the vicinity of the proposed pipelines alignment. The power line runs on the western side of the New England Highway. The pipelines alignment will pass under the power line at one location, south of land formally known as Brunkers Lane. The pipelines route has been aligned so as to avoid interference with the existing power line.

In the event that soil excavation is required in the vicinity of existing power lines Energy Australia will be contacted.

4.14.4 Newpac Personnel Emergency Device System

Newpac have installed a Personnel Emergency Device (PED) system to provide a fast and reliable method of locating and communicating with underground personnel in the event of an emergency situation.

Part of this system includes a loop antenna which, located at surface level, transmits a signal to the PED unit worn by each underground miner.

The loop areal is basically a single core cable, and for Newpac is located just below ground level approximately 750m south of Ravensworth Final Void No. 4 East.

In the event that soil excavation is required, for the northern section of the pipelines alignment in the vicinity of existing PED, Newpac will be contacted.

5. Conclusion

Information contained within this document, and associated references, provides sufficient information to allow assessment of the environmental impacts associated with the proposed modifications.

Issues identified as having the largest potential for environmental impact are:

- surface water impacts associated with water leakage from pipeline failure
- air quality impacts associated with the construction of the pipeline containment earthen bund and vehicle movements

The implementation of the environmental management safeguards proposed in this statement of environmental effects shall minimise the impact of surface waters and air quality associated with this modification.

Environmental safeguards proposed to address these and the other issues combine to ensure that the proposed modifications can be undertaken with minimal additional environmental impact.

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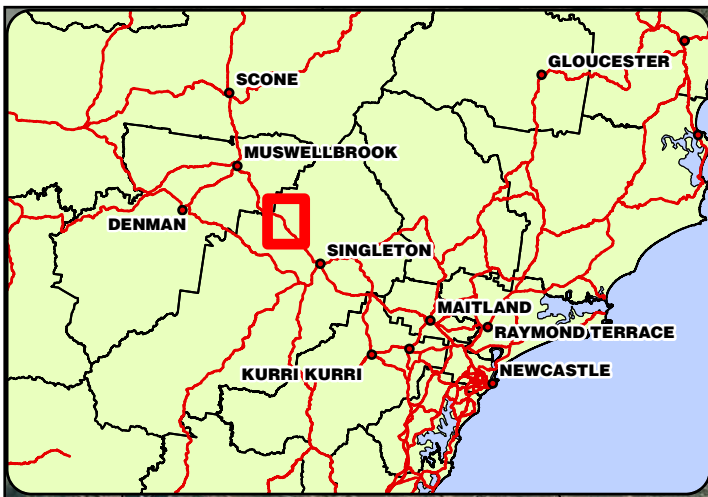
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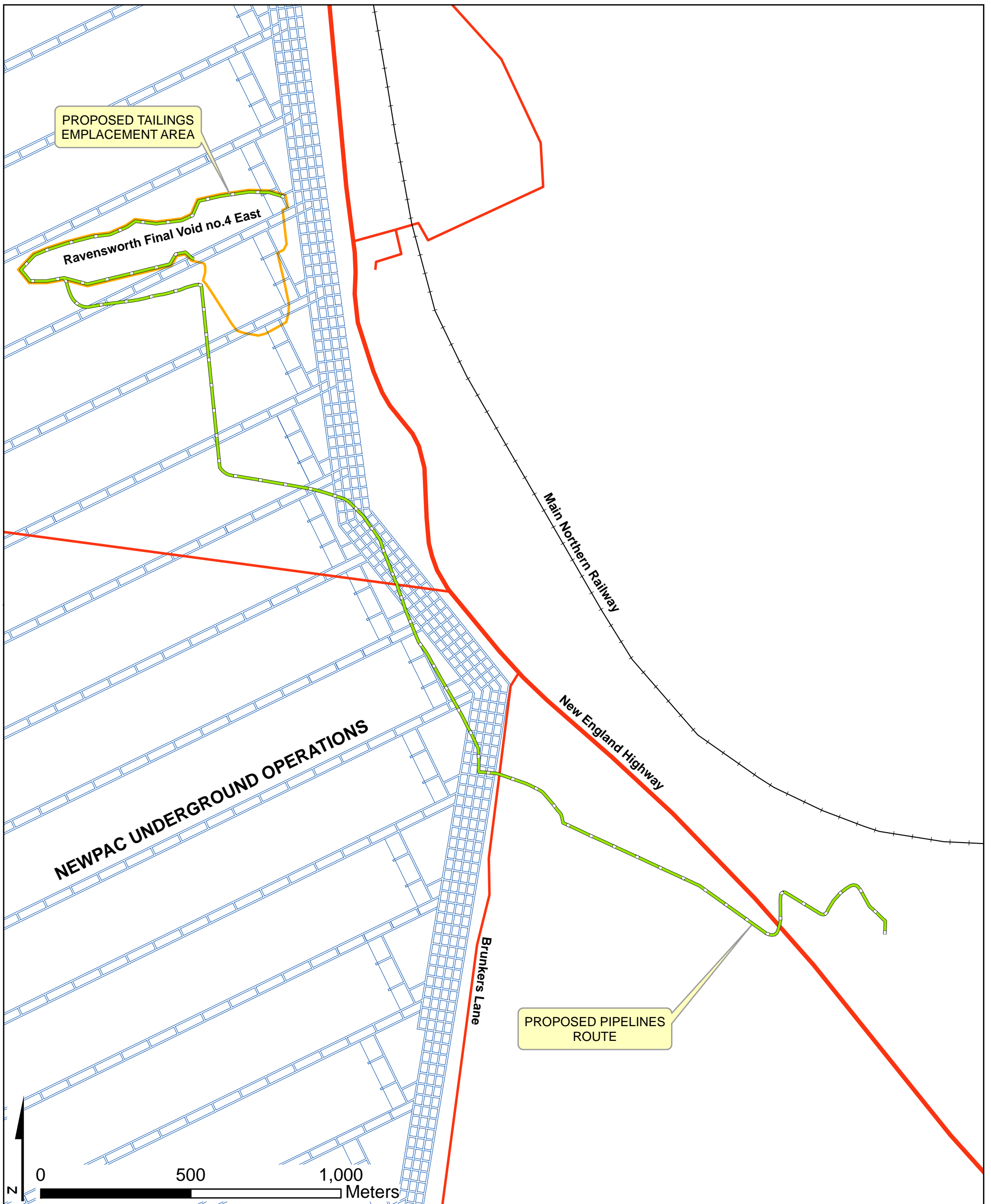
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Figures




	New England Highway
	Proposed Pipelines Route
	Ravensworth Final Void No.4 East
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Client: Ashton Coal Operations		Drawn: CSB	Date: 11 July, 2006
Proj. No. 2118508A Layout Size: A3		Designed: CSB	Date: 11 July, 2006
GIS Proj: J:\A402-SGL\PROJ\21185XX\2118508\2118508A\5_WrkPapers\GIS\Projects		Checked: WJ	Date: 11 July, 2006
		DWG. No: 2118508A_4003	Fig. No. 1



<ul style="list-style-type: none"> — Newpac Underground Operations — Main Roadways — Proposed Pipelines Ravensworth Final Void No.4 East — Railway Lines
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PDF File: 2118508A_Figure8_080606

Title: Proposed Pipelines and Emplacement Area and Newpac Underground Operations			
Project: Proposed Ashton Tailings Pipelines		Datum: MGA 94 / Zone 56	Scale: 1:12,000
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Appendix A

Insite Heritage Review of Archaeological Issues

Ashton Pipeline
Review of Archaeological issues

Insite Heritage Pty Ltd
PO Box 98 Wangi Wangi 2267

9th May 2006

Summary

Insite Heritage Pty Ltd was commissioned by Parsons Brinckerhoff to assess the need or otherwise for a full archaeological assessment for a portion of a proposed pipeline from Ashton Coal Mine to a void on Macquarie Generation land. The assessment is confined to land outside the area covered by the Ashton Coal EIS.

A void on Macquarie Generation land will be converted into a tailings dam by the introduction of fill to create a dam wall. The pipeline connecting the void with Ashton Colliery will be laid above ground in the area inspected.

A site inspection found no Aboriginal sites along the inspected portion of the pipeline route. The void is archaeologically sterile and the area leading to the void generally comprises re-vegetated overburden. Therefore a full archaeological assessment is not required for the project.

One isolated stone artifact was recorded approximately 500m from the pipeline route within land marked as "Glendell". This item will not be impacted by the project and has been recorded on standard NPWS recording forms.

Proposed Works

The pipeline connecting the mine workings with the void is 350mm in diameter and extends a distance of approximately 3 kilometers. The route of the pipeline has been adjusted to avoid vegetation and a potential European heritage site, and minimise disturbance.

As described above the pipeline within the study area will be generally above ground. The bund wall and dam wall will be constructed from fill sourced from Ashton Coal operations. The conversion of the void into a dam will allow the storage of tailings that will be transported via the pipeline.

Plate 1: The void, note the pipeline route has been heavily ripped.



Plate 2: Mid section of the route traverses re-vegetated overburden.



Discussion

The potential for the proposed pipeline to impact upon Aboriginal heritage sites as the area subject to this report has been extensively disturbed and generally contains rehabilitated overburden. The only area of possible 'natural' ground is located under a complex of farm buildings in the southern portion of the route. There was no evidence of Aboriginal activity in this area probably due to the extensive disturbance associated with this intensive area of European occupation.

Appendix B

Flora and Fauna Assessment

Flora and Fauna Assessment Ashton Coal Tailings Emplacement Project

October 2006

Ashton Coal Operations Pty Ltd



Parsons Brinckerhoff Australia Pty Limited ACN 078 004 798 and
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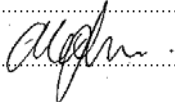
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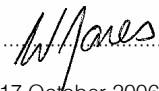
Author: Alex Fraser

Signed: 

Reviewer: Wayne Jones.....

Signed: 

Approved by: Wayne Jones.....

Signed: 

Date: 17 October 2006.....

Distribution: Ashton Coal x 3, PB x 1

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1. Introduction

Parsons Brinckerhoff Australia (PB) has been engaged by Ashton Coal Operations Pty Ltd (hereafter referred to as Ashton Coal) to undertake a Flora and Fauna Assessment provide documentation to accompany a Section 96(2) applications to allow the emplacement of coal tailings in Ravensworth Final Void No. 4 East, including all associated infrastructure.

The emplacement void and associated infrastructure are located on Lot 122 DP872131 within the Singleton Local Government Area (LGA), approximately 16 kilometres north-west of the Singleton Township (as illustrated in **Figure 1**).

The emplacement area will be constructed on heavily disturbed land previously impacted by existing and post mining activities.

2. Flora and fauna

A preliminary flora and fauna assessment of alternative route 1 and associated emplacement area was undertaken by PB in July 2005. The purpose of the assessment was to determine the existing natural environment and likely impacts of the proposal on vegetation and animals, in particular Threatened species, populations, and communities listed under the *Threatened Species Conservation Act 1995* and the *Environment Protection and Biodiversity Conservation Act 1999*.

The assessment found that although the site was highly disturbed and modified, it was of local conservation significance due to the presence of native vegetation that may provide potential habitat for a number of threatened species of animal.

Therefore the preliminary flora and fauna assessment recommended that, further surveys of the site should be undertaken.

In accordance with these recommendations, PB undertook further detailed assessment in May 2006. This assessment included a further survey on alternative route 4 which avoided areas of native vegetation. The results of both surveys are discussed below.

2.1 Study area

The study area consisted predominantly of cleared areas and modified vegetation, with some patches of native plantation and regrowth woodland. Bowmans Creek and a number of small dams were located in the southern section of the proposed route. The proposed alternative pipeline route 4 avoids areas of woodland and mainly follows an existing access road. The southern end of the route crosses under the New England Highway at Bowmans Creek.

The site is within the Sydney Basin bioregion (Thackway & Cresswell 1995) and the North Coast botanical subdivision (Anderson 1961, 1968).

2.2 Methods

This assessment included a desktop review and habitat-based field investigations. No targeted surveys were conducted.

Two site visits were completed on 22 June 2005 and 3 May 2006.

All work was carried out under NSW Department of Environment and Conservation Scientific Licence number S10445 and a NSW Department of Agriculture Animal Research Authority (AW01/1380).

Species of plant

Plant species on site were assessed and recorded using the random meander technique (Cropper 1993), where the recorder walks in a random manner throughout the site, recording all species seen. The time spent in each vegetation community was generally proportional to the size of the community and its species richness.

The quality of vegetation was assessed using parameters such as intactness, diversity, history of disturbance, weed invasion and health.

Three categories were used to describe the condition of vegetation communities:

- *Good:* Vegetation still retains the species complement and structural characteristics of the pre-European equivalent. Such vegetation has usually changed very little over time and displays resilience to weed invasion due to intact ground cover, shrub and canopy layers.
- *Medium:* Vegetation generally still retains its structural integrity but has been disturbed and has lost some component of its original species complement. Weed invasion can be significant in such remnants.
- *Poor:* Vegetation that has lost most of its species and is significantly modified structurally. Often such areas now have a discontinuous canopy of the original tree cover, very few shrubs and exotic species, such as introduced pasture grasses or weeds, replacing much of the indigenous ground cover. Environmental weeds are often co dominant with the original indigenous species.

Fauna habitat

The fauna survey of the study area was primarily based on the habitats present as well as opportunistically recording fauna sites. By the very nature of their rarity, Threatened species are often difficult to detect. Therefore, suitable habitat is the most important factor to consider when determining the potential presence.

Fauna habitats were assessed by examining characteristics such as the structure and floristics of the canopy, understorey and ground vegetation, the structure and composition of the litter layer and other habitat attributes important for feeding, roosting and breeding. Indirect evidence of faunal activity such as scats, diggings, scratch marks etc was also investigated. The following criteria were used to evaluate habitat values:

- *Good:* A full range of fauna habitat components are usually present (for example, old-growth trees, fallen timber, feeding and roosting resources) and habitat linkages to other remnant ecosystems in the landscape are intact.
- *Moderate:* Some fauna habitat components are often missing (for example, old-growth trees, fallen timber), although linkages with other remnant habitats in the landscape are usually intact although sometimes degraded.
- *Poor:* Many fauna habitat elements in low quality remnants have been lost, including old growth trees (for example, due to past timber harvesting or land clearing) and fallen timber, and tree canopies are often highly fragmented. Habitat linkages with other remnant ecosystems in the landscape have usually been severely compromised by extensive past clearing.

2.3 Database searches and literature review

Records of threatened species of plant and animal were obtained from the Department of Environment and Conservation Atlas of NSW Wildlife within the Singleton Local Government Area (Department of Environment and Conservation 2006, accessed 1//05/06). Records for threatened species, populations and communities and migratory species listed under the *Environment Protection and Biodiversity Conservation Act 1999* that could potentially occur in the area were obtained from the Department of the Environment and Heritage Protected Matters Search Tool (Department of the Environment and Heritage 2006, accessed 19/05/2005), within a 10 kilometre radius of the study site.

Vegetation mapping and previous flora and fauna assessments within the region were also consulted including:

- Vegetation of the Central Hunter Valley, New South Wales (Peake 2005)
- Bayswater Power Station EIS Fly Ash Disposal in Ravensworth No. 2 Mine Void and Mine Rehabilitation EIS (1993)
- Ashton Coal Project EIS
- Ravensworth South Coal Mine EIS
- Ravensworth Waste Management Centre EIS
- Nardell Underground Coal Mine EIS.

The condition of aquatic habitats provided is summarised from a previous consultancy report prepared by Marine Pollution Research Pty Ltd (2001) as part of the Ashton Coal Mine EIS, and was confirmed by observations made during field investigations.

3. Existing environment

The majority of the site has been cleared and significantly modified by past and current mining activities and consisted mainly of introduced grassland. Some small patches of native plantation and regrowth Casuarina Woodland occur along the pipeline route. The creek is bounded by Riparian Woodland (Hunter Valley River Oak Forest). The location of these communities is illustrated in **Figure 1**. These communities are described below:

Vegetation communities

Introduced grassland

The ground cover within the site is dense and dominated by introduced grasses and herbs including *Chloris gayana*, *Hyparrhenia hirta*, *Senecio madagascariensis*, *Bidens pilosa* and *Sida rhombifolia*. Few native species existed and were restricted to small patches that were less disturbed. Native species recorded include *Cymbopogon refractus*, *Themeda australis*, *Cheilanthes sieberi* and *Aristida warburgii*.

The soil profile is highly modified and it would be unlikely that a native seed bank would be present to provide for natural regeneration of native vegetation.

The vegetation within this community is highly modified and is not consistent with any native vegetation community and is in poor condition.

Native plantation

Three small areas of planted Eucalypts and Acacias occurred within the study area, the proposed pipeline route was been modified to avoid impacts to these sites.

The plantings include *Eucalyptus tereticornis*, *E. punctata*, *E. maculata* and Acacia species. These plantings are approximately 10 years old and the majority of the eucalypts have not reached reproductive maturity. Acacias are typically short-lived and those planted would likely to be nearing the end of their life span. The ground cover was very sparse and dominated by introduced grasses and herbs including *Chloris virgata*, *Plantago major*, *Senecio madagascariensis* and *Sida rhombifolia*.

No natural regeneration of shrub species is evident within these sites and the soil profile has been highly modified in the past. Small scattered patches of native grasses and herbs occurred, including *Cymbopogon refractus*, *Themeda australis* and *Aristida warburgii*.

This vegetation was not consistent with a native vegetation community and, is in poor condition.

Casuarina woodland

Small patches of Casuarina Woodland occur in the vicinity of the study area. The proposed pipeline route has been modified to avoid affecting these areas.

This community was dominated by *Casuarina luehmannii*. The shrub layer was absent and the ground cover was dominated by the introduced grass *Chloris gayana*. Small scattered patches of native grasses occur within the community and included *Cymbopogon refractus*, *Themeda australis* and *Aristida warburgii*.

This community has a moderate level of weed invasion and is in moderate condition.

Hunter Valley River Oak Forest

Hunter Valley River Oak Forest (Peake 2005) occurs as a narrow strip adjacent to Bowmans Creek. It contains an open canopy of *Casuarina glauca* and has a ground layer dominated by grasses and herbs such as *Microlaena stipoides*, *Persicaria decipiens*, *Dichondra repens*, and introduced species including *Chloris gayana*, *Ageratina adenophora*, *Bidens pilosa*, *Melinis repens*, *Juncus acutus* and *Paspalum dilatatum*.

This community is disturbed, has moderate weed invasion and is in moderate condition.

Terrestrial Fauna habitats

The fauna habitats present within the study area generally correspond to the vegetation communities described above.

The site of the proposed pipeline provides limited habitat for fauna as the pipeline route does not contain any significant habitat features such as ground cover vegetation, leaf litter, fallen timber for shelter and protection from predators; or isolated paddock trees with hollows for roosting or nesting. These cleared areas were classified as having poor habitat values.

The native plantation sites contain a moderately dense canopy of eucalypt trees that did not contain any tree hollows. The shrub layer was sparse and there were no significant groundcover habitats such as fallen dead timber, significant leaf litter or rock outcrops. These sites provide marginal foraging habitat for generalist and woodland species of bird and have poor habitat values.

The *Casuarina* woodland was located in small isolated patches and did not contain significant groundcover habits. The fauna habitat values of this community are poor.

Bowmans Creek is bounded by a narrow strip of Hunter Valley River Oak Forest with limited understorey habitat features. However, this riparian community would provide habitat for and potential foraging resources for a range of native species. Surface rocks and some large boulders on the river bed that may be used by reptiles, amphibians and Water Rat (*Hydromys chrysogaster*). The habitats in this area were of moderate value.

Aquatic habitats

According to Marine Pollution Research (2001) Bowman Creek is a sub-drainage of the Hunter River, draining north to south from the Barrington Plateau. The creek is suitable for fish passage during most flow conditions, even during prolonged dry spells, as there is adequate deep long pools to provide suitable drought and flood refuge for fish and other aquatic life (Marine Pollution Research Pty Ltd 2001). On the eastern side of the New England Highway, there is moderate riparian cover surrounding a deep pool with *Typha* vegetation and a partly submerged fallen dead tree snag. Introduced Common Carp (*Cyprinus carpio*) were recorded within this area.

There was indication of some stock damage on both sides of the creek which included inundated ditches that harboured infestations of introduced Mosquito Fish (*Gambusia holbrooki*). The western side of the creek was dry but surface rocks, some large boulders and vegetation on the river bed may be used by native fish as spawning habitats during flowing periods.

The creek provided significant aquatic habitat on a local basis to support or allow the passage of expected fish species from the locality and thus must be considered major fish habitat and a Class 1 stream under the NSW Fisheries classification scheme (Marine Pollution Research Pty Ltd 2001). Although the creek is ephemeral, it does provide fish passage opportunities allowing the deep pool to be colonised by Common Carp and potentially other species including native Freshwater Catfish (*Tandanus tandanus*). Therefore, the aquatic habitats were considered to be of moderate value.

Corridors and connectivity

Wildlife corridors can be defined as “retained and/or restored systems of (linear) habitat which, at a minimum enhances connectivity of wildlife populations and may help them overcome the main consequences of habitat fragmentation” (Wilson & Lindenmayer 1995). Corridors can provide ecological functions at a variety of spatial and temporal scales from daily foraging movements of individuals, to broad-scale genetic gradients across biogeographical regions.

Corridors serve a number of different functions in terms of conservation including:

- providing increased foraging area for wide-ranging species
- providing cover for movement between habitat patches, and enhancing the movement of animals through sub-optimal habitats
- reducing genetic isolation
- facilitating access to a mix of habitats and successional stages to those species which require them for different activities (for example, foraging or breeding)
- providing refuge from disturbances such as fire
- providing habitat itself
- linking wildlife populations and maintaining immigration and decolonisation between otherwise isolated patches. This in turn may help reduce the risk of population extinction (Wilson and Lindenmayer 1995).

Within the site, the Casuarina woodland and native plantation sites were highly fragmented and did not play a significant role in a wider corridor network. Bowmans Creek was not identified as a regionally significant corridor (Upper North and Lower North East Fauna Corridors, NSW National Parks and Wildlife Service 2001), however the creek system extends throughout the wider locality and is likely to be important for the local movement of wildlife.

4. Species, populations and communities of conservation concern

Threatened ecological communities

Endangered Ecological Communities are listed under Schedule 1, Part 3 of the *Threatened Species Conservation Act 1995*, while Threatened Ecological Communities (Critically Endangered, Endangered and Vulnerable) are listed under the *Environment Protection and Biodiversity Conservation Act 1999*.

The vegetation identified within the study area did not correspond to any Endangered Ecological Community.

Endangered populations

Endangered Populations are listed under Schedule 1 Part 2 of the *Threatened Species Conservation Act 1995*. The following populations are listed within the Hunter Catchment and Singleton Council Local Government Area:

- *Eucalyptus camaldulensis*
- *Acacia pendula*

Neither of these populations were observed or are considered likely to occur within the site.

Threatened vegetation

Review of the DEC Atlas of NSW Wildlife within the Singleton Local Government Area identified sixteen species of threatened plant or their habitats that have been recorded previously within the vicinity of the site. No threatened species of plant or endangered populations was recorded within the site during the current survey and due to the highly modified environment, no threatened species of plant is likely to occur (**Table 1**).

Table 1 Threatened species of plant previously recorded within the vicinity of the site

Scientific Name	Common Name	TSC Act ¹	EPBC Act ²	Potential habitat
<i>Boronia ruppia</i>	-	E1		No
<i>Cynanchum elegans</i>	White-flowered Wax Plant	E1	E	No
<i>Darwinia biflora</i>	-	V	V	No
<i>Darwinia peduncularis</i>	-	V		No
<i>Digitaria porrecta</i>	-	E1	E	No
<i>Dillwynia tenuifolia</i>	-	V	V	No
<i>Diuris sheaffiana</i>	-	V		No
<i>Eucalyptus camaldulensis</i>	River Red Gum	E2		No
<i>Eucalyptus fracta</i>	-	V		No
<i>Eucalyptus glaucina</i>	Slaty Red Gum	V	V	No
<i>Grevillea evansiana</i>	-	V	V	No
<i>Melaleuca groveana</i>	-	V		No
<i>Olearia cordata</i>	-	V	V	No

Scientific Name	Common Name	TSC Act ¹	EPBC Act ²	Potential habitat
<i>Persoonia hirsuta</i>	-	E1	E	No
<i>Persoonia marginata</i>	-	V	V	No
<i>Pterostylis gibbosa</i>	-	E1	E	No
<i>Thesium australe</i>	-	V	V	No

1: V= Vulnerable, E1 = Endangered (Threatened Species Conservation Act 1995)

2: V = Vulnerable, E = Endangered (Environment Protection and Biodiversity Conservation Act 1999)

Threatened fauna

No Threatened fauna species were recorded during field surveys. A total of 54 Threatened faunal species have been recorded or have the potential to occur in the study area, comprising eight species of amphibian, one species of reptile, 22 species of bird and nineteen species of mammal.

Of the total 54 Threatened species, 21 species are listed under *the EPBC Act 1999*.

Table 2 Threatened and migratory species of animal previously recorded within the vicinity of the site

Scientific Name	Common Name	TSC Act ¹	EPBC Act ²	Potential habitat
Amphibians				
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V	V	No
<i>Litoria aurea</i>	Green and Golden Bell Frog	E1	V	No
<i>Litoria booroolongensis</i>	Booroolong Frog	E1		No
<i>Litoria daviesae</i>	Davies' Tree Frog	V		No
<i>Litoria littlejohni</i>	Heath Frog	V	V	No
<i>Mixophyes balbus</i>	Stuttering Frog	E1	V	No
<i>Philoria sphagnicolus</i>	Sphagnum Frog	V		No
<i>Pseudophryne australis</i>	Red-crowned Toadlet	V		No
Native Birds				
<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	V		No
<i>Climacteris picumnus</i>	Brown Treecreeper	V		No
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	E1		No
<i>Erythrotriorchis radiatus</i>	Red Goshawk	E1	VM	No
<i>Grantiella picta</i>	Painted Honeyeater	V		No
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle		M	No
<i>Hamirostra melanosternon</i>	Black-breasted Buzzard	V	M	No
<i>Hirundapus caudacutus</i>	White-throated Needletail		M	No
<i>Ixobrychus flavicollis</i>	Black Bittern	V		No

Scientific Name	Common Name	TSC Act ¹	EPBC Act ²	Potential habitat
<i>Lathamus discolor</i>	Swift Parrot	E1	EM	No
<i>Melanodryas cucullata</i>	Hooded Robin	V		No
<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater	V		No
<i>Monarcha melanopsis</i>	Black-faced Monarch		M	No
<i>Myiagra cyanoleuca</i>	Satin Flycatcher		M	No
<i>Neophema pulchella</i>	Turquoise Parrot	V		No
<i>Ninox connivens</i>	Barking Owl	V		No
<i>Ninox strenua</i>	Powerful Owl	V		No
<i>Pachycephala olivacea</i>	Olive Whistler	V		No
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler	V		Yes. Marginal habitat at native plantation and riparian woodland at Bowmans Creek.
<i>Pyrrholaemus sagittata</i>	Speckled Warbler	V		No
<i>Rhipidura rufifrons</i>	Rufous Fantail		M	No
<i>Rostratula benghalensis</i>	Painted Snipe	E1	VM	No
<i>Stagonopleura guttata</i>	Diamond Firetail	V		No
<i>Tyto novaehollandiae</i>	Masked Owl	V		Limited foraging
<i>Tyto tenebricosa</i>	Sooty Owl	V		No
<i>Xanthomyza phrygia</i>	Regent Honeyeater	E1	EM	No
<i>Native Mammals</i>				
<i>Aepyprymnus rufescens</i>	Rufous Bettong	V		No
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V		No
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	Limited foraging
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	E	No
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V		No
<i>Macropus parma</i>	Parma Wallaby	V		No
<i>Miniopterus australis</i>	Little Bent-wing Bat	V		Limited foraging
<i>Mormopterus norfolkensis</i>	Eastern Freetail-bat	V		Limited foraging
<i>Myotis adversus</i>	Large-footed Myotis	V		No
<i>Petaurus australis</i>	Yellow-bellied Glider	V		No
<i>Petaurus norfolcensis</i>	Squirrel Glider	V		No
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	E1	V	No
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	V		No
<i>Phascolarctos cinereus</i>	Koala	V		No
<i>Potorous tridactylus</i>	Long-nosed Potoroo	V	V	No
<i>Pseudomys oralis</i>	Hastings River Mouse	E1	E	No
<i>Pteropus poliocephalus</i>	Grey-headed Flying-	V	V	No

Scientific Name	Common Name	TSC Act ¹	EPBC Act ²	Potential habitat
	fox			
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V		Limited foraging
<i>Thylogale stigmatica</i>	Red-legged Pademelon	V		No
Reptiles				
<i>Hoplocephalus bungaroides</i>	Broad-headed Snake	E1	V	No

1: V= Vulnerable, E1 = Endangered (Threatened Species Conservation Act 1995)

2: V = Vulnerable, E = Endangered, M = Migratory, C = Conservation Dependent (Environment Protection and Biodiversity Conservation Act 1999).

No threatened species of fish listed under the NSW *Fisheries Management Act 1994* or Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* are expected to occur in the Hunter River system or tributaries (Department of Environment and Conservation 2006; Department of the Environment and Heritage 2006; Marine Pollution Research Pty Ltd 2001).

Although the site is highly disturbed, it is likely to provide marginal habitat for Grey-crowned Babbler, and marginal foraging habitat for Masked Owl and four microchiropteran species of bat (Greater Broad-nosed Bat, Large-eared Pied Bat, Little Bent-wing Bat and Eastern Freetail Bat). Grey-crowned Babbler is conspicuous and no evidence of this species was recorded in the site. Hollow-bearing trees that provide roosting habitats for microchiropteran bats were also absent. As such, these species are considered unlikely to occur within the site.

Migratory species

Migratory species are protected under international agreements to which Australia is a signatory including the *Japan Australia Migratory Bird Agreement* (JAMBA), the *China Australia Migratory Bird Agreement* (CAMBA) and the *Bonn Convention on the Conservation of Migratory Species of Wild Animals*. Migratory species are considered Matters of National Environmental Significance and are protected under the *Environment Protection and Biodiversity Conservation Act 1999*

A number of migratory bird species listed under these agreements have been recorded in the project locality. However, the study area is not considered important habitat for any migratory species as it does not contain:

- habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species
- habitat utilised by a migratory species which is at the limit of the species' range
- habitat within an area where the species is declining.

As such, impacts of the proposal on migratory species are not considered further.

Critical habitat

Critical Habitat is listed under both the *Threatened Species Conservation Act 1995* and *Environment Protection and Biodiversity Conservation Act 1999* and both the State and Federal Directors-Generals maintain a register of this habitat. Critical habitat is the whole or

any part or parts of an area or areas of land comprising the habitat of an endangered species, an endangered population or an endangered ecological community that is critical to the survival of the species, population or ecological community (Department of Environment and Conservation 2005).

No critical habitat was recorded in the study area.

5. Impacts of the proposal on flora and fauna

The construction of the pipelines would be aligned at ground level for the majority of the route and sides of the pipelines would be surrounded by an earthen bund approximately 500 millimetres in height. This would occur predominantly within highly disturbed areas and its route has been selected such that it does not impact upon native vegetation. No natural regeneration of shrub species was evident within this area and the soil profile had been highly modified and as such it was considered likely that a native seed bank would be largely absent. Areas of native plantation, Casuarina woodland and small dams are avoided by the proposed pipeline route.

The proposal would result in some disturbance of Bowman's Creek on the eastern side of the New England Highway. The works would require vegetation clearing of a relatively small area of riparian Casuarina Woodland to widen a previously cleared area (for the installation of underground fibre optic cables), and involves excavation to a depth of 1.5 metres for the installation of pipelines. The pipeline installed in sleeves will be concrete encased and then covered with natural <200mm diameter rocks and boulders to a level flush with the existing creek bed.

The habitats available within the Hunter Valley River Oak Forest are limited, however habitat for amphibians would be affected in a relatively small area. Although there would be short term impacts to riparian habitats, given appropriate mitigation measures provided (see following impact amelioration recommendations); it is unlikely that long-term impacts to amphibian populations would result.

Overall, the impacts associated within construction are likely to be minor as areas of native vegetation have been largely avoided. Due to the proximity of the site to existing mining activities, it is considered that the impacts of construction and operational noise on animals would be negligible. Due to the dominance of weeds within the site, construction has the potential to aid weed seed dispersal, particularly outside of the development footprint via Bowmans Creek.

Potential impacts on Threatened species, populations and communities

No endangered ecological communities, populations, or species were recorded within the site. Although the site is highly disturbed and modified, it would possibly provide marginal foraging for six Threatened species of animal (Grey-crowned Babbler, Masked Owl, Greater Broad-nosed Bat, Large-eared Pied Bat, Little Bent-wing Bat and Eastern Freetail Bat). However, the location of the pipeline route has been modified from previous plans to avoid areas of woodland and native plantation and despite the existence of records in the locality or the occurrence of predicted habitat, none of the Threatened species are considered likely to be significantly affected by the proposed upgrade activities for one or more of the following reasons:

- core habitats were not recorded in the study area
- the area is outside the normal range of the species and records are likely to be of vagrants or invalid
- the species is considered locally extinct

- resources used by the species are unlikely to be adversely affected, or only likely to be minimally affected by the proposal.

Given the disturbed nature of vegetation and habitats on site it is unlikely that the proposal would impact Threatened species, populations or communities. A referral to the Department of the Environment and Heritage is not required.

6. Impact amelioration

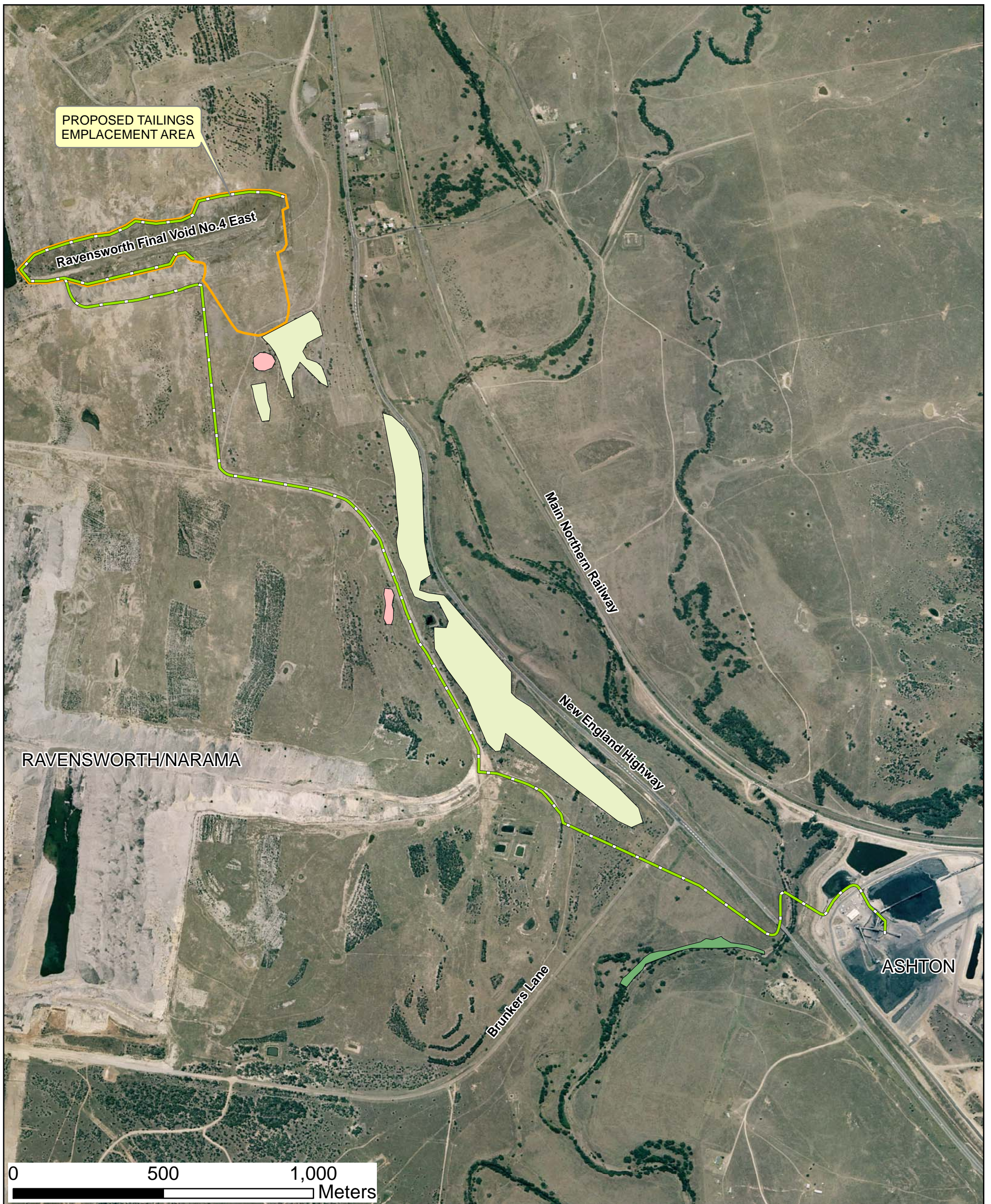
A general principle of environmental management is to, in order of preference;


1. **avoid** environmental impacts
2. **minimise** impacts
3. **mitigate** the impacts
4. as a last resort once the above options have been investigated, **compensate** for the residual impacts.






In order to further ameliorate any impacts of the proposal and to ensure that best environmental practice is followed, mitigation measures listed below have been recommended:

- any potential sedimentation to Bowmans Creek should be avoided by stabilising banks ensuring that soil, fill or construction materials is not be stockpiled within the vicinity of the creeks
- root damage and soil compaction at Bowmans Creek is avoided by not parking or storing construction equipment and materials under the drip line of trees. This would avoid compaction within the root zone and also prevent any potential erosion of creek banks
- ensure that construction equipment, vehicles, clothing and boots have been cleaned of weed seeds and soil prior to leaving site or accessing Bowmans Creek
- replace disturbed surface rock cover and boulders on river bed on top of concrete encased pipelines, and where possible try to avoid displacing large boulders
- if any amphibians are encountered they should be relocated to adjacent habitats using the protocols to avoid the potential spread of Chytrid amphibian fungus disease. This involves the use of a separate pair of latex gloves each time when handling each individual
- provide fencing along the creek to prevent cattle damage to soft riparian banks which may cause erosion prior to revegetation
- revegetate disturbed areas of Bowmans Creek with indigenous species of plants which could potentially **improve** the quality of riparian habitats


Figures





 Proposed Pipelines	 Ravensworth Final Void No.4 East
	 Casuarina Woodland
	 Native Plantation
	 Hunter Valley River Oak Forest

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Title:			
Vegetation Communities		Datum: MGA 94 / Zone 56	Scale: 1:12,000
Project:	Proposed Ashton Tailings Pipelines	Drawn: CSB	Date: 11 July, 2006
Client:	Ashton Coal Operations	Designed: CSB	Date: 11 July, 2006
Proj. No.	2118508A	Layout Size: A3	Checked: WJ
GIS Proj:	J:\A402-SGL\PROJ\21185XX\2118508A\5_WrkPapers\GIS\Projects	DWG. No: 2118508A_Fig1	Date: 11 July, 2006
			Fig. No. 1