Stage 2 Dry Ash Placement - Kerosene Vale Ash Dam Project Application and Preliminary Environmental Assessment

December 2006

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NCSI Certified Quality System ISO 9001

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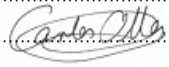
Signed:	
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Distribution:	

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Holmes Air Services 2006	Review of Existing Air Quality and Scoping Study for Stage 2 Development of Ash Dam at Kerosene Vale
Parsons Brinkerhoff 2006	Preliminary Noise Assessment for Stage 2 Kerosene Vale Ash Dam
Parsons Brinkerhoff 2006	Preliminary Ecology Assessment for Stage 2 Kerosene Vale Ash Dam

Project summary

Project	Stage 2 Dry Ash Placement - Kerosene Vale Ash Dam (KVAD)
Objective	Extension of an existing ash storage area to enable storage of ash from Wallerawang Power Station (WWPS). This would enable the ongoing generation of power for the next 11 years.
Capital cost	Approximately AUD$8.2 million.
Construction employment	Primarily relates to development of stabilisation features and would be limited.
Operational employment	2 x drivers 100%, 1 x environmental 50%, 1 x surveyor x 10%, 1 x supervisor x 50%. Total = 5 staff. Total estimated cost of repository, including haulage, is $12.54 million until 2017, where output estimations are covered by a 10 year plan.
Construction time frame	6 months.
Operational time frame	From 2007 until 2018.
Location	10 kilometres north-west of Lithgow (refer *Figure 1.1*).
Affected Delta Property Lot Nos	DP Nos. 16/555844, 17/855844 and 5/829137, which are Delta Electricity property.
Major elements	▪ Realignment of Sawyers Swamp Creek in association with development of a stormwater management strategy for the site. ▪ Development of stabilisation structures along the northern edge of the KVAD to ensure stability following completion of the revised landform. ▪ Expansion of current dry ash placement activities at the KVAD over the extended area of the KVAD (refer to *Figure 1.2*). ▪ Twenty-four hour trucking operations to move ash from the WWPS to the KVAD placement area along a Delta Electricity internal haul road.
Any ancillary works	Development of noise mitigation features along the western boundary following the detailed assessment proposed as part of the environmental assessment (refer to *Chapter 7*). Realignment of existing site drainage systems and associated systems for management of Sawyers Swamp Creek Dam and associated rehabilitation.
Key environmental issues	Hydrology and water management (flooding, surface water and groundwater), air and noise.

1. Introduction

1.1 Background

The Wallerawang Power Station (WWPS) was constructed in September 1958 and currently has a total electricity production capacity of 1,000 megawatts, provided by two generating units each with 500 megawatts capacity. The WWPS provides electrical output to the Sydney metropolitan region and Wellington in the Central West of New South Wales (NSW).

The WWPS produces electricity using pulverised coal-fired boilers and steam-driven turbo-generators. A by-product of this electricity production is ash, in the form of fly ash and bottom ash. In order to maintain existing power station operations, this ash needs to either be sold for beneficial use purposes or stored for future use. Options for beneficial uses have been assessed in *Section 2.2*.

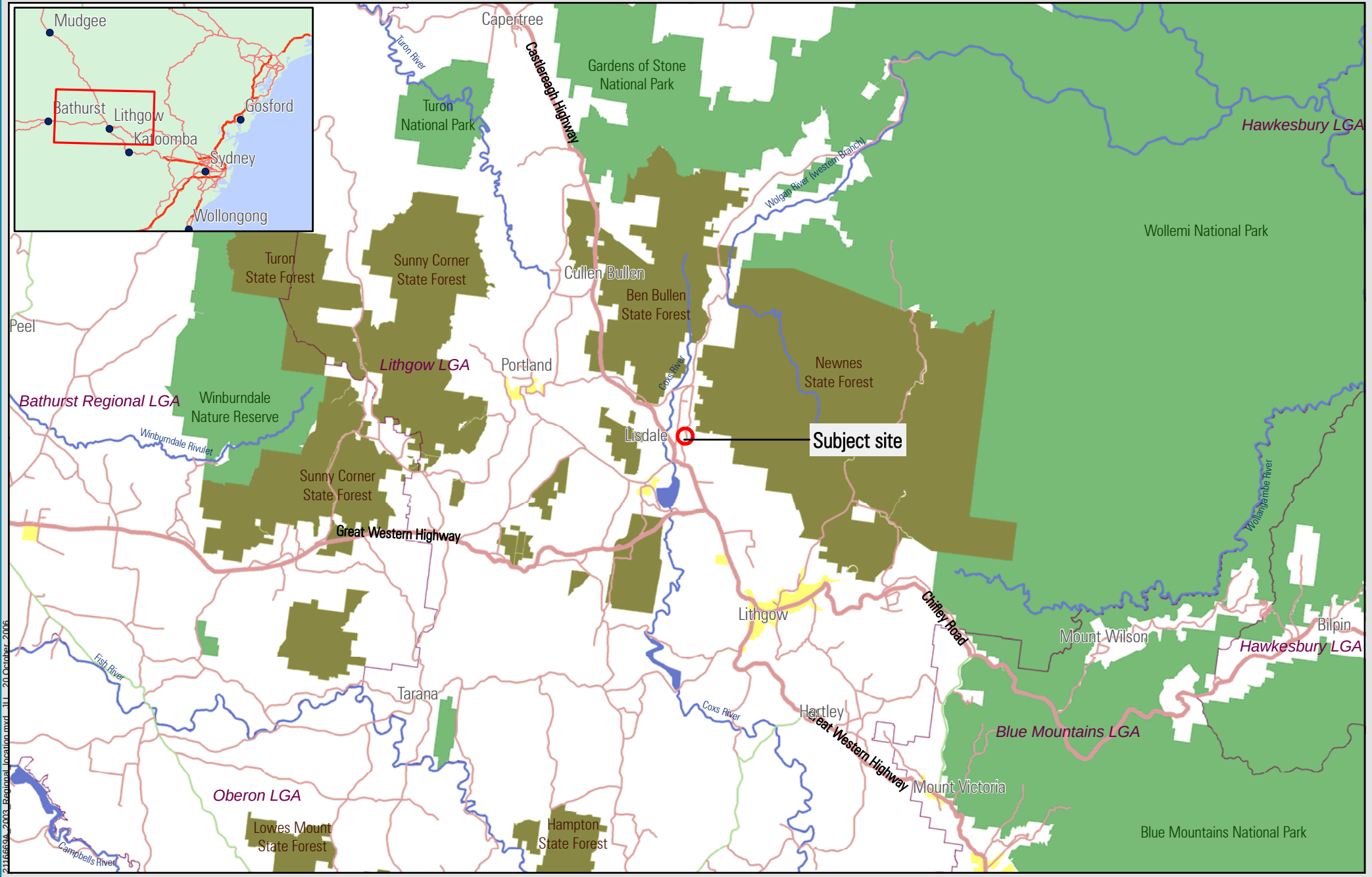
In 2002, Delta Electricity assessed the use of the Kerosene Vale Ash Dam (KVAD) as an area for the placement of ash generated from the WWPS for storage purposes. This assessment determined that the area over KVAD could be divided into two operational areas. Areas that could be used without the need for engineering stability works, realignment of Sawyers Swamp Creek or clearing (identified as Stage 1 areas); and areas that required engineering stabilisation works, realignment of Sawyers Swamp Creek or vegetation clearing prior to use (identified as Stage 2 areas).

Stage 1 addressed Delta Electricity's immediate operational needs. The placement of ash in the Stage 1 areas was undertaken under approvals obtained in 2002, which included a Review of Environmental Factors (REF) and associated approval under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Stage 1 was designed to operate for a period of 5 years and is now reaching its design capacity. Current estimates indicate that this capacity would be reached by the end of 2008 (approximately 22 months).

Stage 2, which is the subject of this Project Application and Preliminary Environmental Assessment, is the proposed expansion of the storage area to enable the continued placement of ash over the KVAD for a further 11 years, at which time it is anticipated that alternative use options would have improved (refer to *Section 2.2*).

The Stage 2 area has an approximate capacity of 5.5 million cubic metres, bringing the total storage capacity at the KVAD (Stages 1 and 2) up to 8.0 million cubic metres. The use of the Stage 2 area would enable the WWPS to continue to produce electricity for the next 11 years, during which time the ongoing viability of the WWPS would need to be reassessed in relation to long-term operational capacity and upgrade.

This Project Application and Preliminary Environmental Assessment for the Stage 2 Dry Ash Placement - Kerosene Vale Ash Dam (KVAD) seeks to review and assess the project area identified in *Figure 1.2* and its operation and construction as described in *Chapter 3.*



Principal road
Secondary road
Minor road
Rivers and streams
National Parks
State Forests
Town areas
Local Government boundaries

Figure 1.1 Site location

N

10 5 0 Kilometers

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Figure 1.2 Ash placement areas

1.2 Proponent

Delta Electricity is a NSW Government-owned corporation, which produces approximately 12% of the electricity used by consumers in NSW, Victoria, South Australia, Queensland and the Australian Capital Territory. Most of Delta Electricity's generation occurs at four power stations located in NSW: Mt Piper, Wallerawang, Vales Point and Munmorah. These power stations have a combined generating capacity of 4,240 megawatts.

1.3 Need for the project

Stage 1 of the Dry Ash Placement at Kerosene Vale Ash Dam (KVAD) was designed to operate for a period of 5 years and is now reaching its design capacity. Current estimates indicate that this capacity would be reached by the end of 2008 (approximately 22 months).

In the absence of significant reuse alternatives, the only viable option is to expand the Stage 1 placement area to enable the continued placement of ash over the KVAD area for a further 11 years, at which time it is anticipated that alternative use options would have improved (refer to *Section 2.2*).

In the absence of reuse option as discussed in Chapter 2 or an alternative area to place the ash produced during power generation activities at WPPS. WPPS operations would be required to either reduce production to extent the operational life of Stage 1 or close down operations at the completion of the Stage 1 area. Both of these options would have associated impacts on the electricity supply grid in the area and are considered undesirable. As result this project is required to maintain the existing power supply activities in this region of NSW and further discussion of alternatives is provided in *Chapter 2.*

1.4 Purpose of this report

This report forms part of a Project Application for the proposed Stage 2 Dry Ash Placement - Kerosene Vale Ash Dam (KVAD). This Project Application is required under Part 3A of the EP&A Act, recognising that the project has the potential to significantly affect the environment.

This report identifies and helps to define the key environmental issues associated with the project. It also aims to provide sufficient information to the Minister for Planning and the relevant public authorities to make an initial assessment of the project and develop detailed requirements for the detailed environmental assessment to be prepared in the next phase.

The report provides a description of the project, a discussion of the need for the project, alternative options, a preliminary environmental review and a proposed scope for the detailed environmental assessment. The detailed environmental assessment would be undertaken following the review of this document by the Department of Planning and the provision of the Director-General's Requirements.

1.5 Structure of this report

The structure and content of this report is summarised in *Table 1.1*.

Table 1.1 Structure and content of this report

Chapter/Appendix	Description
Chapter 1 - Introduction	Outlines the background, location, and the need for the project. It also depicts the proponent and purpose of the report.
Chapter 2 – Options assessment	Outlines the preferred option and the alternatives considered.
Chapter 3 – Project description	Outlines the proposed operational and construction requirements of the project.
Chapter 4 – Statutory planning	Outlines the planning strategies, policies and legislation that apply to the project.
Chapter 5 – Community consultation	Outlines the communication strategy, proposed consultation activities and summarises the issues raised by the community/stakeholders.
Chapter 6 – Preliminary environmental assessment	Describes the potential impact of the project on the environment and the community and outlines requirements for the detailed environmental assessment.
Chapter 7 – Proposed scope for environmental assessment of key issues	Outlines the proposed scope for environmental assessment of the key issues to be considered in the detailed environmental assessment under Part 3A of the *EP&A Act*.
Appendix A – Design drawings	Contains engineering design drawings relevant to the project.

2. Options assessment

2.1 Do nothing

The current storage capacity for the Stage 1 KVAD is expected to reach its capacity in approximately 22 months (end of 2008). Once reached, operations at the WWPS would be required to cease unless alternative ash storage locations or beneficial reuse options can be identified. This would result in the reduction of power supplied to the NSW grid and the possibility of blackouts due to insufficient supply.

This outcome is not considered viable for power supply in the region.

2.2 Reuse of ash

Ash from power generation activities can be reused for cementitous, horticultural, gravel and road base uses, where the quality of ash following power production is of a sufficiently high standard. Delta Electricity has investigated the reuse of ash from its power generation activities in each of these areas.

2.2.1 Cementitous uses

Fly ash currently used by cement companies needs to be of a very high standard, with less than 2% unburnt carbon. Ash produced by the WWPS has around 16% unburnt carbon, due to the burning process and coal supply used at this plant. Modifications to the power generation operations would enable separation of finer ashes and reduction of the unburnt carbon content; however, these modifications are unlikely to reduce the unburnt carbon content to the required level to make this reuse option viable.

2.2.2 Horticultural uses

Current environment regulations do not allow fly ash to be used in any horticultural process. The Ash Development Association of Australia (ADAA) has negotiated an exemption for this use from the Department of Environment and Conservation (formerly the Environment Protection Authority); however, this exemption expires in December 2006 and an extension is proving difficult to achieve. A Delta Electricity representative has been invited to join the Board of the ADAA and has already instigated discussions for reclassifying fly ash as a fertiliser. Delta Electricity is keen to pursue the development of the use of ash for horticultural purposes, as this will provide an additional asset to Delta Electricity's operations. Delta Electricity would continue to pursue this option as the Stage 2 activities progress.

2.2.3 Gravel and road base uses

A number of companies have expressed their interest in processes that blend ash with polymers to produce a product that has similar properties and strengths as quarry gravel. However, to use this product in major road projects it would need to be approved by the relevant authorities. At the time of writing this document, it has not been approved for use. Options for reuse of ash for road projects would continue to be pursued throughout the life of the Stage 2 operations.

2.3 Ash storage at Mt Piper

This option would involve transporting ash produced by the WWPS to the existing dry ash storage facility at Mt Piper. The considerations with respect to this option are as follows:

- Increased traffic would result in increased noise and amenity impacts on communities surrounding Mt Piper and Wallerawang as transport of the ash would require the use of the public road network, increasing the potential for off-site impacts.
- There would be a substantial increase in fill deposited at Mt Piper, which would result in a decrease in the life span of the existing Mt Piper ash storage facility. If the facility at Mt Piper fills more quickly than expected, new land at Mt Piper or a new process would then be required to store ash arising from both plants, not just the Wallerawang operations.
- Mt Piper would experience an intensification of its ash storage operation, which was unintended in the original design, and could result in unexpected off-site impacts.
- Mixing of the two ash by-products, which have different qualities, may hinder or restrict reuse options and further increase the requirement for placement areas.
- Operating costs for this option would be high.

2.4 Ash storage at the KVAD

The considerations with respect to proposed ash storage at the KVAD are:

- The material would be placed in an area of the KVAD that has been used for ash placement in the past, resulting in less environmental impact than use of another location.
- The proposed ash placement strategy is based on a proven method used during the Stage 1 placement operations at the KVAD.
- The KVAD's proximity to the WWPS would mean reduced transport impacts and associated costs.
- Existing infrastructure and equipment at the WWPS and the KVAD used during Stage 1 could be used for dry ash placement at Stage 2.

- The design allows for ash stored at the KVAD to be extracted and reused in industry if sufficient demand develops at a later date.

2.5 Preferred option

The preferred option is to extend the current Stage 1 ash placement activities and operate a dry ash storage facility at Kerosene Vale over the Stage 2 area (refer to *Figure 1.2*).

The Stage 2 KVAD area provides a long-term storage option with minimal change in operational requirements from Stage 1, as the proposed Stage 2 activities would operate in a similar manner. The preferred option also provides for the reuse of ash if viable options are identified in the future.

The preferred option would provide Delta Electricity with sufficient operational capacity for approximately 11 years. A detailed description of this option is provided in *Chapter 3.*

3. Project description

3.1 Project location and site history

The KVAD is located approximately 2.5 kilometres north-east of the WWPS and approximately 10 kilometres north-west of the city of Lithgow (refer to *Figure 1.1*), which is 150 kilometres west of Sydney.

The nearest residences (at Lidsdale) are approximately 1.5 kilometres west of the KVAD, and the community of Wallerawang is approximately 4.5 kilometres to the south-west of the KVAD. The project area falls within the Lithgow Local Government Area.

Kerosene Vale is located wholly within the Sawyers Swamp Creek Catchment, which flows into the Coxs River and forms part of the Sydney Drinking Water Catchment.

The KVAD was constructed between 1960 and 1990. During this period, it was filled with a combination of ash and mining spoil. The dam was finally capped in about 1990.

In 2001, Delta Electricity assessed the need for operational changes from wet ash to dry ash activities at the WWPS. This decision required the identification of an area for the placement and storage of ash by-products. The area identified for this purpose was the KVAD, due to its historic use for this purpose. Since this change and approval in 2002, the area over the KVAD has been used for ash placement and site management activities for the WWPS.

Prior to commencement of the Stage 2 operations, the Stage 1 operations would cease and the Stage 2 activities would be extended from the open face of the Stage 1 areas. The Stage 1 areas that have reached the design height of 940 Australian Height Datum (AHD) would be capped, limiting interaction between Stage 1 and Stage 2 to areas of connecting storage placement (refer to Appendix A).

3.2 Ash placement activities

Activities for Stage 2 would be similar to the activities associated with Stage 1 and are described in the following Sections. Some additional construction works associated with stabilisation activities would be required as described in S*ection 3.2.2*.

3.2.1 Operational activities

The key proposed operational activities for Stage 2 are as follows:

- Fly ash would be pneumatically conveyed from the WWPS to a storage silo, where it would be conditioned to approximately 15% moisture content for dust suppression and enhanced compaction once placed over the KVAD.

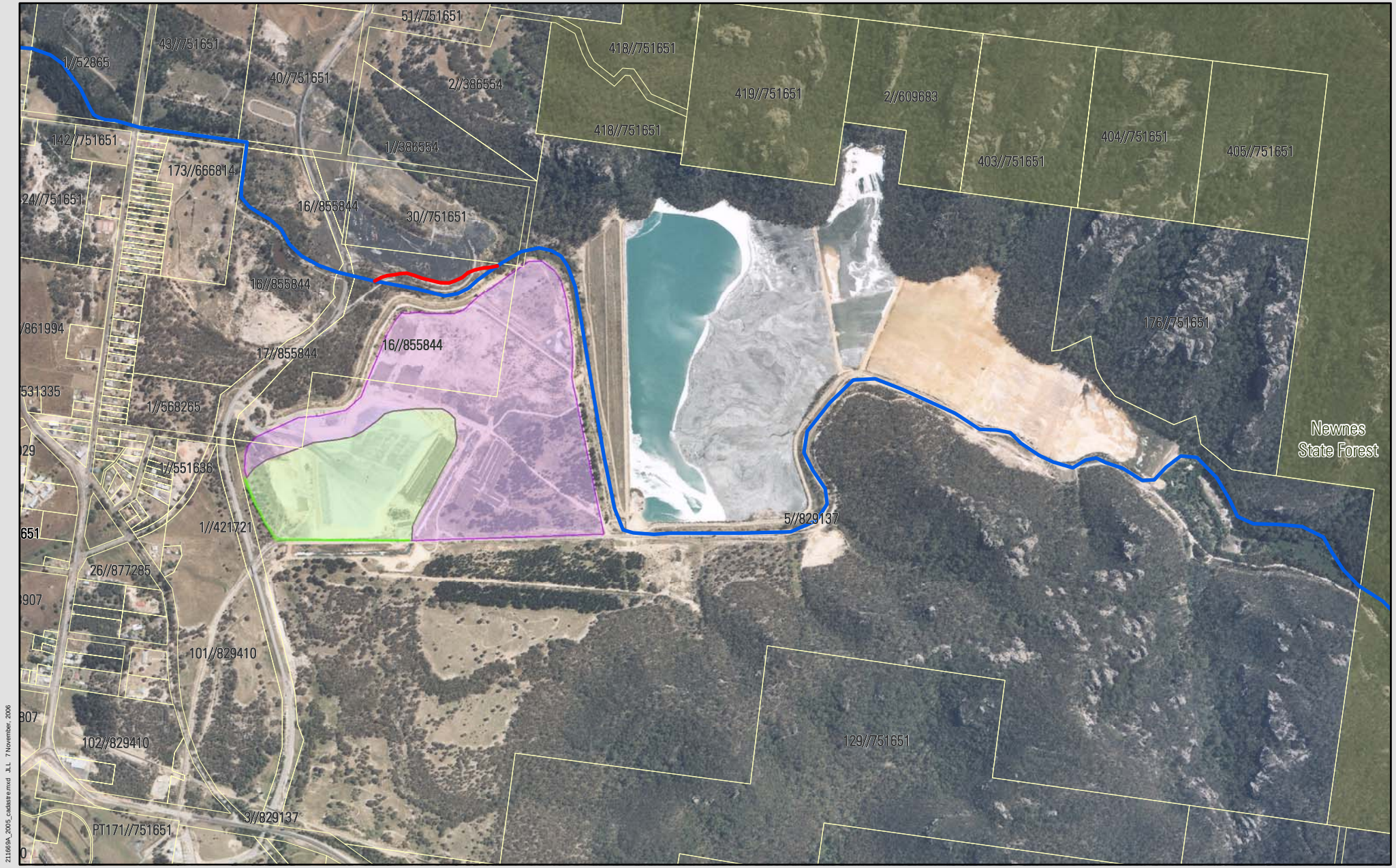
- Fly ash would be transported from the storage silo via the existing haul road in semi-trailers or trucks with attached dog-trailers. This would involve approximately 60 vehicle trips per day.
- Fly ash would then be deposited at the ash placement area and taken up in 1-2 metre lifts using compactors and bulldozers to enable correct land forming and drainage to be established.
- Placement would be in line with the section diagrams provided in *Appendix A*. The placement would progress in an easterly direction over the pine plantation area and then in a northerly direction towards Sawyers Swamp Creek.
- Ash would be progressively capped once the design height of 940 AHD is reached. Material taken from the pine plantation area would be used for this purpose (refer to *Section 3.2.2*).
- All trucks would pass through a vehicle wash before leaving the ash placement area.
- Surface water monitoring is currently undertaken to assess changes to the quality of receiving waters, and this would be continued throughout the operation of Stage 2.
- Leachate generation from the Stage 1 activities has been reduced by employing a range of mitigation measures. These would be continued during Stage 2 and incorporated into the detailed environmental assessment (see *Chapter 7*). These measures would include:
  - reduced water application for dust suppression
  - recycling and reuse of water runoff from the KVAD placement area
  - recycling of water arising in the Lidsdale Cut, perimeter drains and basins to Sawyers Swamp Creek Ash Dam for subsequent reuse at the KVAD.
- Operations are proposed to be undertaken 24 hours a day. However, this would be subject to review in relation to noise impacts as part of the detailed environmental assessment (refer to *Chapter 7*).
- Surface drainage would be captured to minimise impacts on Sawyers Swamp Creek. Captured water would be used in site operations.

3.2.2 Construction activities

The key construction activities for Stage 2 would include the following:

- Sawyers Swamp Creek would be re-aligned to allow space for stabilisation works (refer to *Figure 3.1*). This realignment would be assessed in detail as part of the detailed environmental assessment (refer to *Chapter 7*) and would include rehabilitation in line with Department of Natural Resources' requirements.
- The existing bund wall at Kerosene Vale would be buttressed and strengthened to contain the ash storage.
- Material from the pine plantation would be excavated to provide space for ash placement and capping material for both the Stage 1 and Stage 2 areas.

- A water retention system would be established, to serve as a water collection basin to ensure that all site run-off is captured for treatment and reuse within the WWPS operations. This would be designed to minimise impacts on Sawyers Swamp Creek (refer to *Figure 3.1*). This activity would be assessed in detail as part of the detailed environmental assessment (refer to *Chapter 7*).
- Mitigation measures as identified through the detailed environmental assessment process would be developed and implemented.
- Rerouting or modification of the existing settlement canal on the eastern edge of the current placement area would be undertaken to allow the continued reuse of water from the Sawyers Swamp Creek Ash Dam, adjacent to the KVAD area, in the WWPS operations.



Site drainage

- Alignment option 1
- Current alignment
- Stage 1 operations
- Stage 2 operations
- State Forests
- Parcels

Parcel text
2//1018958
Lot number//Deposited Plan

Figure 3.1 Proposed Stage 2 Kerosene Vale Ash Dam

N

0 250 500 Meters

4. Statutory planning

4.1 Lithgow Local Environmental Plan 1994

As a State-owned corporation under the *State Owned Corporations Act 1989,* Delta Electricity is both a 'public authority' and a 'determining authority' pursuant to clause 4 of the EP&A Act. Accordingly, the project is considered to comprise a 'public authority undertaking'.

The project is located within the Lithgow Local Government Area. The site of the project is zoned 1(a) Rural (General) under the *Lithgow Local Environmental Plan 1994* (the Lithgow LEP). This zoning provides that all development that is not listed as either permissible without consent, or prohibited under the Lithgow LEP in the 1(a) zone, is permissible with consent.

The Lithgow LEP prohibits the following activities within this zone:

> development for the purposes of boarding houses, bulky goods salesrooms and showrooms; commercial premises; motor showrooms; residential units; shops (other than general stores).

The LEP designates the following activities as permissible without consent:

> Development for the purposes of agriculture (other than livestock keeping establishments or ancillary dwellings); bushfire hazard reduction; forestry (other than ancillary dwellings); home based child care.

Accordingly, the proposed activity is neither permissible without consent nor prohibited in the 1(a) Rural (General) zone.

However, the LEP adopts the *Environmental Planning and Assessment Model Provisions* (the Model Provisions), which state that, generally, no LEP may restrict or prohibit the carrying out of a 'public utility undertaking'.

Clause 35 [Schedule 1, paragraph 8] of the Model Provisions states:

> Nothing in the local environmental plan shall be construed as restricting or prohibiting or enabling the consent authority to restrict or prohibit:
>
> (a) the carrying out of development of any description specified in Schedule 1,
>
> (b) the use of existing buildings of the Crown by the Crown, or
>
> (c) home occupations carried on in dwelling-houses.

The project falls within the relevant definition of Schedule 1 of the Model Provisions that specifies the following development as not requiring development consent under the Lithgow LEP, in respect to public utility undertakings for the supply of electricity:

> The carrying out by persons carrying on public utility undertakings, being water, sewerage, drainage, **electricity** or gas undertakings, of any of the following development, being development required for the purpose of their undertakings that is to say –
>
> (a) Development of any description at or below surface of the ground,
>
> (f) any other development except
>
> (i) the erection of buildings, the installation or erection of plant or other structures or erections and the reconstruction or alteration, so as to materially affect the design or external appearance, thereof, of buildings; or
>
> (ii) the formation or alteration of any means of access to a road

The proposal to place ash over the KVAD is an undertaking by Delta Electricity for the purpose of supporting electricity generation. The scope of the project is to reinstate the areas of the existing ash storage facility. Accordingly the project falls under the meaning of Section (f) of Schedule 1 of the Model Provisions. The project is, therefore, permissible without consent under the Lithgow LEP.

4.2 Part 3A of the EP&A Act

On 1 August 2005, the new Part 3A 'Major infrastructure and other projects' commenced, amending the EP&A Act and consequently the approvals process for major projects. A Ministerial declaration was made in the Government Gazette of 29 July 2005. This declaration stated that, in accordance with Section 75B of the EP&A Act, any activity for which the proponent is also the determining authority, and which would have previously required an environmental impact statement under Part 5 of the Act, can now be assessed under the new Part 3A.

The Stage 1 ash placement activities at the KVAD were approved under Part 5 of the EP&A Act. As the Stage 2 activities are an extension to the approved Stage 1 activities, they also fall under Part 5 requirements. The Stage 1 works were deemed to not have a potentially significant environmental effect, due to the small area of impact and short-term nature of the activities. However, the REF undertaken for Stage 1 (ERM, Hyder 2002) indicated that an environmental impact statement under Part 5 would be required for the Stage 2 activities (this project) as the Stage 2 activities would have an extended life and would affect a larger area. On this basis, an environmental impact statement was anticipated for the Stage 2 activities (the subject of this Project Application).

In order to confirm this assessment, and as part of the development of this Project Application, a review of the potential of the Stage 2 activities to cause significant environmental impacts was undertaken. This review (see *Chapter 6*) identified potentially significant impacts in relation to noise and air impacts on local residences (refer to *Section 6.2 and 6.3),* as well as impacts on the Sydney Drinking Water Catchment. The impacts on the Sydney Drinking Water Catchment would include:

- the relocation or modification of Sawyers Swamp Creek, which is a feeder to the Coxs River (refer to *Section 6.1)*
- changes to the hydrological regime over the placement area and associated impact on surface water run-off to Sawyers Swamp Creek *(*see *Section 6.1)*
- potential changes to the composition of surface water run-off and groundwater due to the chemical composition of the ash material.

A review of these issues determined that these modifications have the potential to significantly affect the environment and, as such, an environmental impact statement would have been required under Part 5 of the EP&A Act. A Part 3A application is consequently required for the Stage 2 activities. This Project Application has been prepared as the initial phase of the Part 3A process for planning approval.

The general process for Part 3A applications is outlined in *Figure 4.1*. For projects subject to Part 3A of the EP&A Act, issues that can be mitigated through the use of standard environmental management measures can be identified at an earlier stage in the assessment process through the preparation of a Project Application and Preliminary Environmental Assessment (this report). This approach allows the environmental assessment for a project to focus on key environmental issues. It also recognises that the project development, option selection and design processes have already avoided or reduced the extent of some impacts. The potential impacts of the project are discussed in *Chapter 6*.

4.3 Regional and state planning instruments

4.3.1 Drinking Water Catchments Regional Environmental Plan No. 1

The *Drinking Water Catchments Regional Environmental Plan No. 1* was prepared in accordance with Part 3 of the EP&A Act and the *Sydney Water Catchment Management Act 1998*. The plan was made to secure the environmental, social and economic future of the catchments that supply drinking water to Sydney, the Blue Mountains and the Illawarra. These catchments extend over 16,000 square kilometres, from the headwaters of the Coxs River, north of Lithgow, to the Shoalhaven River, south of Braidwood. The plan aims to sustain these catchments so as to create healthy water catchments, improve water quality in degraded areas, and maintain or improve water quality where it is currently suitable. The plan comes into effect on 1 January 2007.

The project requires the realignment of a section of Sawyers Swamp Creek, which feeds into the Coxs River, and is part of the Drinking Water Catchment. The *Drinking Water Catchments Regional Environmental Plan No 1* is accordingly relevant to the project. As part of the requirements of the Regional Environmental Plan, the detailed assessment would need to assess whether the project would have a neutral or beneficial effect on water quality. The proposed scope for this assessment is provided in *Chapter 7*.

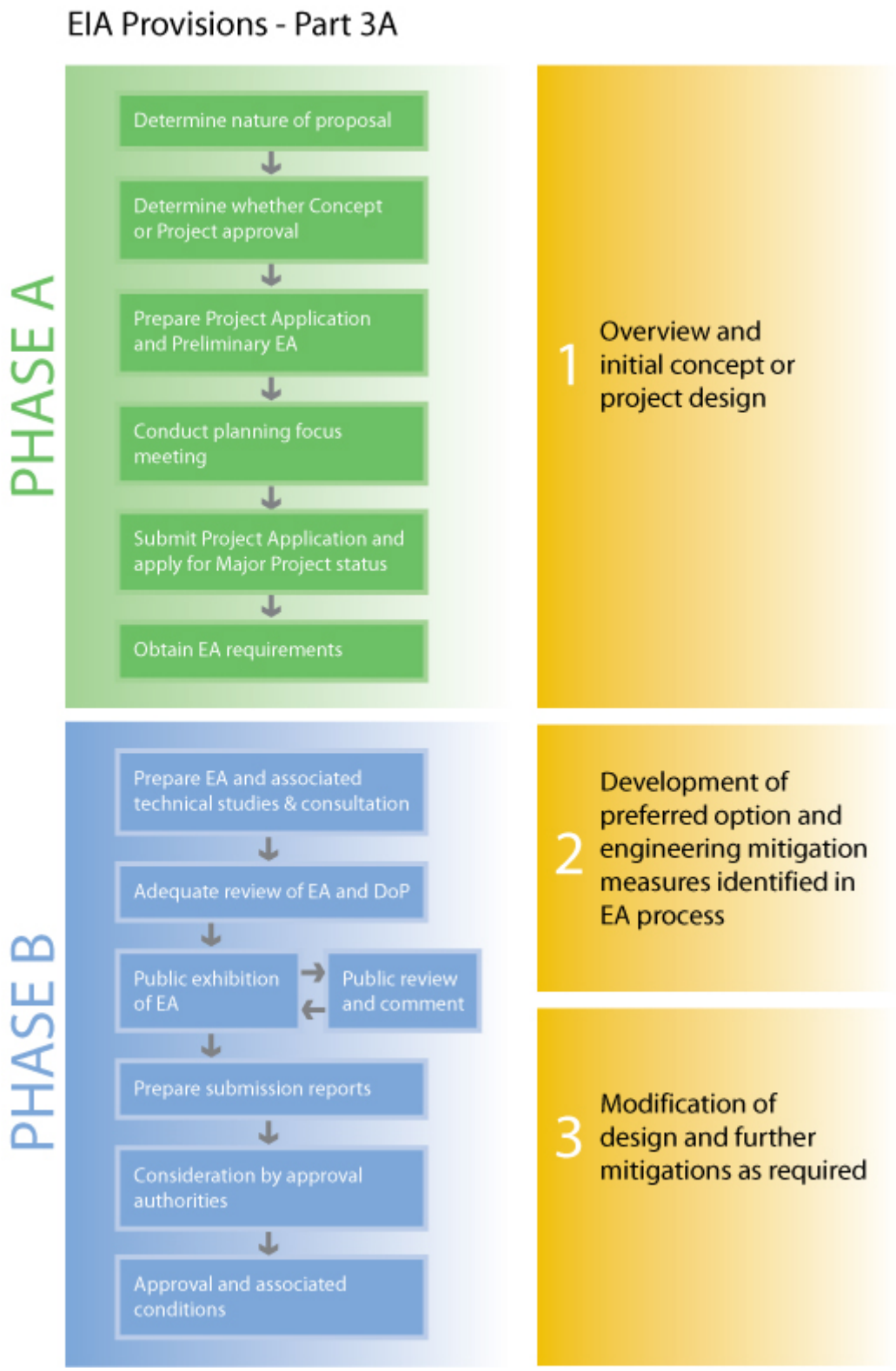


Figure 4.1 Part 3A process

4.3.2 State environmental planning policies

No state environmental planning policies are specifically relevant to this project.

4.4 Commonwealth legislation

An ecological assessment undertaken by Parsons Brinkerhoff (PB 2006) did not identify any threatened species or communities (refer to *Section 6.4*) or any sites identified under Schedule 1 of the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999.*

Accordingly, no referral to the Commonwealth Environmental Minister is likely to be required, as no Commonwealth legislation has been identified as being applicable to this project.

4.5 Other applicable legislation, licences and approvals

A review of other NSW and/or Commonwealth legislation that may be applicable to the construction, development and ongoing maintenance of the project, which may trigger the requirement for further licences, permits and approvals, has been undertaken. This review, in association with focused field studies, did not identify any other requirements, as the project is classified as an 'existing use' for the site (ash placement) and would merely require a minor modification to the existing licence conditions. It is not anticipated that the project would affect any threatened species or heritage sites (refer to *Sections 6.4 and 6.5*). If unknown sites are identified during the project implementation, the relevant legislation would be applied and managed through identified practices within the industry.

5. Community consultation

5.1 Overview

A communications strategy has been developed by Delta Electricity and Parsons Brinckerhoff (PB) for implementation during the Part 3A environmental assessment process in accordance with Department of Planning guidance documents. The proposed consultation strategy is designed to create awareness of the project, gather stakeholder input and ensure the concerns of those directly affected by the project and the wider community are addressed during the project development and assessment.

The strategy includes a level of flexibility to accommodate ongoing evaluation of the communication activities and amendment of the proposed consultation process should this be required.

Communication and involvement with stakeholders has and will take place during the following phases of the project:

- preparation of the Project Application and Preliminary Environmental Assessment (this report)
- preparation of the detailed environmental assessment.

5.2 Project application phase

Consultation during the development of the Project Application and Preliminary Environmental Assessment has focused on government authorities and inputs from the community obtained during Stage 1 operations and the initial consultation process. A detail consultation process is proposed for the extended approvals process. This is further outlined below.

5.2.1 Community concerns

Many key community concerns were identified during the development and operation of Stage 1, and there has been ongoing correspondence with locally active community members in relation to specific issues associated with the operation of Stage 1. Issues that have been identified to date include:

- noise impacts on surrounding properties
- hours of operation in association with noise impacts
- air quality impacts on surrounding properties
- light impacts on local residence during night-time operations.

In light of the existing community issues associated with the Stage 1 operations, a detailed Community Consultation Plan has been developed on behalf of Delta Electricity to be implemented during the assessment phase of the project. The outcome of this consultation would be incorporated into the detailed environmental assessment.

5.2.2 Government authorities

Initial consultation has been undertaken with the following authorities:

- the Department of Planning (Ricardo Prieto-Curiel)
- the Department of Natural Resources (Greg Brady)
- Department of Environment and Conservation (Chris Marshall)
- the Sydney Catchment Authority (Malcolm Hughes)
- the Bathurst Local Aboriginal Land Council (Richard Peters and Warwick Peckham)
- Lithgow Council (Gary Wallace).

The issues raised during this process have been identified by each of these statutory bodies as outlined below. These comments have been incorporated, where practicable, into the proposed scope of work for the detailed environmental assessment as outlined in *Chapter 7*. It is anticipated that further consultation would be required during the detailed environmental assessment phase.

Department of Planning (DoP)

The DoP has been consulted throughout the development of this Project Application to confirm the requirements under Part 3A and confirm that the project falls under this Part of the EP&A Act. In this respect, the DoP has, in principle, indicated that the project falls under Part 3A.

Additionally, the DoP has indicated that a review of the beneficial reuse of the ash will be important in relation to this project. Accordingly, *Section 2* of this Project Application was prepared considering input provided by the DoP based on its experience with projects of a similar nature.

Department of Natural Resources (DNR)

The DNR undertook a site visit on 2 November, 2006 and provided a letter with comments to PB on 9 November, 2006. The DNR has indicated that the project would provide an opportunity to re-establish an otherwise degraded section of Sawyers Swamp Creek to a more naturalised form and function, and assist in mitigating current creek bank soil erosion issues.

The DNR has provided an extended list of the requirements that would be imposed if this was not a Part 3A project, and acknowledged that the final approval would fall under DoP approval requirements.

The extended requirements would be subject to further assessment as the project progresses and will be considered as part of the development of the detailed environmental assessment. Delta Electricity would undertake the design of the realignment of Sawyers Swamp Creek to minimise the impact of the project and improve the current condition of the creek within the constraints of the site location and available space. It is anticipated that ongoing consultation with the DNR in relation to the creek realignment would be required during the detailed environmental assessment.

A proposed scope for the environmental assessment is provided in *Chapter 7*, including a detailed review of the potential impacts of the project on both Sawyers Swamp Creek and the overall hydrological regime of the site.

The underlying principle of endeavouring to improve the quality of Sawyers Swamp Creek in the long term has been incorporated into this Project Application.

Department of Environment and Conservation (DEC)

Initial discussions were undertaken with DEC's Chris Marshall in November via phone at the time of submission of this report subsequent consultation had not occurred although communication with the DEC is ongoing.

It is anticipated that additional comment and input will be provided by the DEC during the formal review period and any additional comments that may be provided following submission of this Project Application to the DoP will be incorporated into the later stages of the approval process.

Sydney Catchment Authority (SCA)

The SCA has indicated a preference for realignment of Sawyers Swamp Creek to a watercourse alignment that is geomorphologically stable in the long term. It is very important that the realigned creek is not subject to erosion (of the bed or banks). Delta Electricity would consider this requirement within the overall design of the creek realignment and would endeavour to establish a geomorphologically stable design for the realigned watercourse.

The SCA has also requested that the detailed environmental assessment considers whether the proposal would have a neutral or beneficial effect on water quality in the area. The proposed scope for hydrological assessment is provided in *Chapter 7* and includes provision for this requirement.

Bathurst Local Aboriginal Land Council (BLALC)

The BLALC undertook a site visit and review of the project, and indicated that it had no objections to the project, as the surveyed area presented no evidence of Aboriginal activity, artefacts, shelters or scarred trees.

On the basis of this assessment, no further assessment of this issue is anticipated in the detailed environmental assessment.

Lithgow Council

Lithgow Council was initially consulted during a meeting on the 23 November, 2006. The Council indicated concerns relating to noise and air emissions, and that it would like to see an improvement in operational noise from the Stage 1 situation, where practical.

On the basis of this meeting, a more detailed scope for the review of these issues has been developed and is provided in *Chapter 7*. Additionally, Delta Electricity is investigating the possibility of installing noise barriers between residential premises and the operational ash placement area. The feasibility of these structures would be further assessed as part of the detailed environmental assessment in consultation with the local community.

At the time of writing this Project Application, no formal correspondence had been provided by Lithgow Council. Any additional comments that may be provided following submission of this Project Application to the DoP will be incorporated into the later stages of the approval process.

Summary

In summary, the key issues raised by government agencies through this consultation process are:

- Clear identification and review of issues associated with the realignment of Sawyers Swamp Creek, including an assessment of the neutral or beneficial impact of this project, are to be undertaken during the detailed environmental assessment.
- The realigned sections of Sawyers Swamp Creek are to be rehabilitated.
- The Creek is to be realigned rather than box culverted. This request has been considered in the development of the design.
- A detailed assessment of possible reuse options for ash by-products is to be provided. This has been included in *Chapter 2* and would be further assessed during the detailed environmental assessment.
- Noise and dust issues are to be further assessed and reviewed for the Stage 2 operations.
- There are no known areas of Aboriginal significance in the proposed development area.

5.3 Communications strategy for environmental assessment phase

The overarching objective of the project communications strategy is to ensure that stakeholders and the community are informed about the current status of the project and understand the outcomes of completion of the project.

The specific communication objectives to be achieved during the environmental assessment phase include:

- to inform the community and key stakeholders about the ash emplacement at the KVAD and its benefits and impacts
- to implement a pro-active, accountable and focused consultation process that clearly demonstrates how the community can be involved during the assessment process
- to create a two-way information flow that enables the community to participate and influence the key environmental, planning and engineering studies to be undertaken as part of the environmental assessment
- to clarify and identify community issues and concerns associated with the project and make provision for these to be effectively communicated and addressed
- to develop relationships of trust with the community and confidence in the consultation and planning process, which can be effectively carried on from the environmental assessment through to the construction, operation and post-operation phases.

In order to achieve these objectives, consultation would be undertaken with key stakeholders both directly (face-to-face meetings) and indirectly (letters, mail outs, signage advertisement, newsletters, etc.). As a minimum this would include:

- an advertised local meeting to advise the community of the project
- an identified mechanism for reporting and raising concerns
- letters to identified stakeholders
- two newsletters to stakeholders during the preparation of the environmental assessment document
- advertisement within local media to advise of public exhibition of the environmental assessment
- public exhibition of the environmental assessment in line with statutory requirements
- assessment of possible mitigation measures to address community concerns
- project team members being available to attend face-to-face meetings with stakeholders directly affected by the project.

The final consultation process would be in line with these commitments and would be amended to address specific stakeholder concerns as the project develops.

6. Preliminary environmental assessment

Preliminary environmental and engineering investigations have been completed in order to determine significant environmental considerations for the project. On the basis of this assessment, a proposed scope of works for the detailed environmental assessment has been developed (refer *Chapter 7*). The final requirements for the environmental assessment would be determined following receipt of the Director-General's Requirements.

As part of this preliminary assessment the following environmental issues have been considered:

- hydrology and water management (flooding, surface water run-off and groundwater)
- air quality
- noise
- biodiversity
- visual impact and landscaping
- traffic and transport
- Indigenous and historic heritage
- land use.

For each of these issues a review of available information and, where necessary, additional field surveys, have been undertaken to classify the issues into two categories:

- issues that are manageable with no further assessment proposed:
  - No further assessment is proposed as the issue can be adequately managed using standard or previously approved procedures that are accepted within the industry. These procedures would be identified in a statement of commitments.
- further environmental assessment proposed:
  - These issues require further investigation during the detailed environmental assessment phase. Proposed measures to manage these issues would be detailed in the environmental assessment once additional studies have been completed.

Identified issues that require more detailed environmental assessment are summarised in *Table 7.1* along with a proposed scope of works for completing these assessments.

A list of the key supporting documents used to undertake this assessment is provided in the table of contents and copies of these can be provided on request.

6.1 Hydrology and water management (flooding, surface water and groundwater)

There would be a requirement to relocate or modify approximately 380 metres of Sawyers Swamp Creek (refer to *Figure 6.1*) as part of the project, which would change the hydrological regime of the site and associated areas within the Sydney Drinking Water Catchment area. This change would require a detailed assessment of the overall hydrological regime and assessment of the potential impact on the Sydney Drinking Water Catchment. As such, this issue requires further investigation during the detailed environmental assessment.

Likewise there is a potential for surface water to infiltrate into groundwater systems with associated impacts, whilst impacts during Stage 1 appear to be limited a further detailed assessment of potential impacts from Stage 2 will be require during the detailed environmental assessment.

The proposed scope of works for this assessment is provided in *Table 7.1* and incorporates initial comments and requirements provided by the DNR to rehabilitate realigned sections of Sawyers Swamp Creek and improve the quality of these sections of the creek.

6.2 Air quality

Holmes Air Sciences completed a preliminary air assessment based on existing information collected for the Stage 1 operations. This investigation determined the potential for emissions from emplacement of ash on the Stage 2 KVAD area to adversely affect air quality at residences in Lidsdale to the west of the KVAD (Holmes Air Services 2006).

The preliminary assessment concluded that there is potential for dust to adversely affect air quality in the closest residential areas to the west of the KVAD. On the basis of this assessment, it is recommended that a more comprehensive investigation is undertaken. This would be undertaken in accordance with NSW Department of Environment and Conservation (DEC) guidelines. The proposed scope of works for this investigation is provided in *Table 7.1*.

6.3 Noise

PB completed a preliminary noise assessment for the Stage 2 KVAD (PB 2006a) based on a review of impacts during the Stage 1 operations.

This review identified the potential for noise impacts on residents close to the site. Identified key noise sources include the movement of trucks along the internal haul road and the operation of earth-moving/shaping mobile plant (dozers, front-end loaders and associated plant). Given the relatively undeveloped nature of the local setting, the operation of these sources would have the potential to result in adverse residential noise impacts.

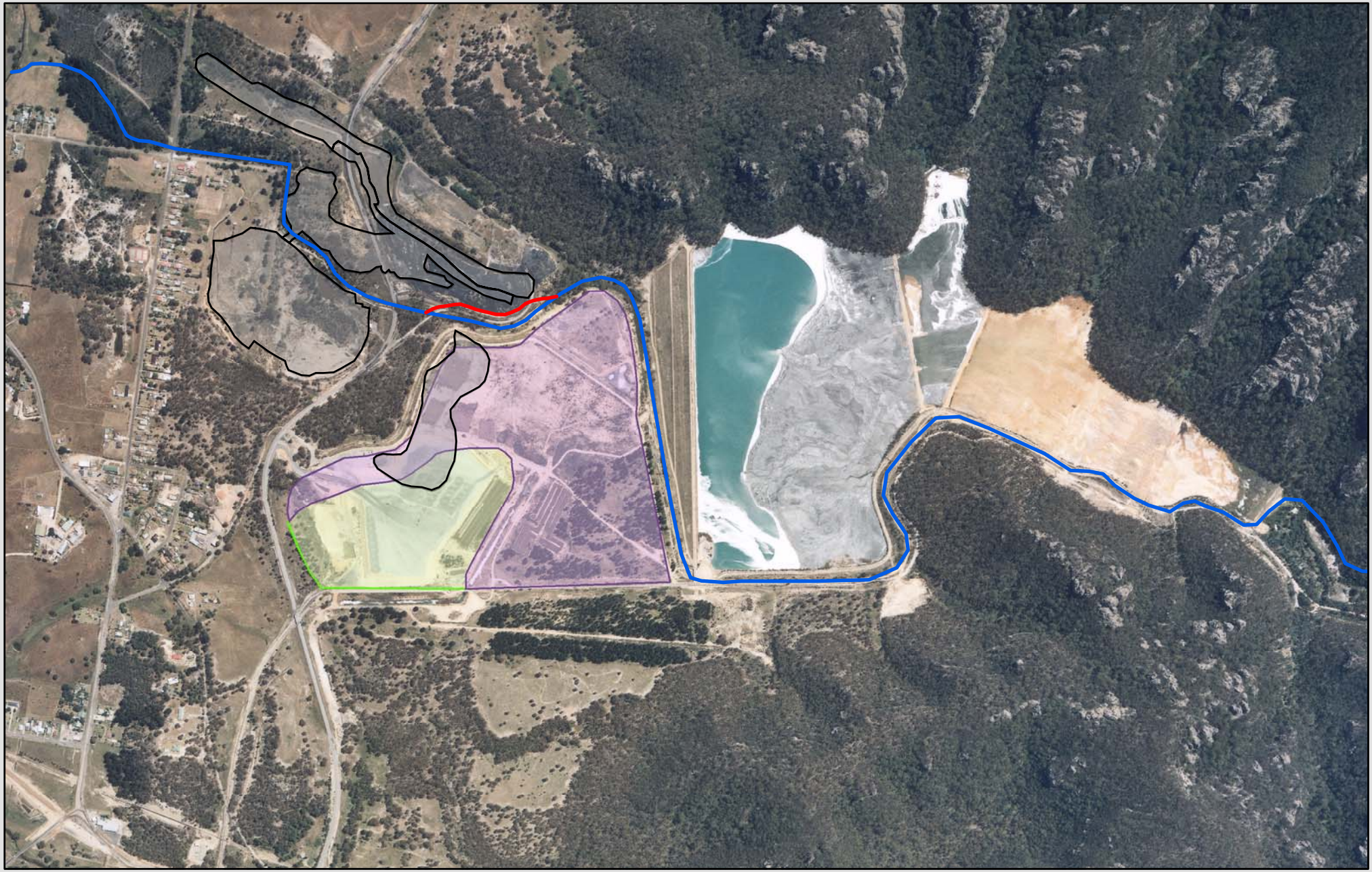


Figure 6.1 Proposed realignment of Sawyers Creek Dam

Noise control options may include establishment of earth berms along internal haul roads, use of residential class mufflers, acoustic shrouding of engine blocks, on-site speed limits, and limiting the number of operational mobile plant during the night-time period.

Delta Electricity has committed to reviewing appropriate noise mitigation barriers along the haulage road closest to the affected residents to mitigate potential noise effects. The effectiveness of these structures would be determined and assessed as part of the environmental assessment.

The proposed scope of works for this assessment is provided in *Table 7.1*.

6.4 Biodiversity

PB has completed a preliminary ecological assessment for the Stage 2 KVAD (PB 2006b), comprising a desktop review and site inspection.

No threatened species, populations or communities were recorded within the site. A total of seven threatened species of plant and 28 threatened species of animal have been recorded within 10 kilometres of the site. These species are considered unlikely to occur in, or be dependent on, the resources of the site (PB 2006b).

No clearing or disturbance of the remnant woodland would be required.

The project is likely to cause some loss of aquatic vegetation as a result of the Sawyers Swamp Creek realignment (refer to *Figure 6.1*). This vegetation would not be critical to the survival of threatened species. Species of animal using this resource would generally be able to move in response to the altered creek alignment and would not be adversely affected (PB 2006b). As part of the design of the creek realignment, a strategy for rehabilitating the realigned section of the creek to improve the quality of this area would be developed in line with DNR requirements.

The initial review concluded that the project is unlikely to significantly affect threatened species biodiversity or the ecological values of the site. Given the highly disturbed nature of the site, no site-specific mitigation measures related to biodiversity are proposed.

In conclusion, biodiversity impacts are considered to be minimal and are manageable with appropriate and well established procedures. On this basis, no further assessment of biodiversity impacts is proposed as part of the detailed environmental assessment. This issue has been assessed as manageable through the use of existing management and industry accepted procedures.

6.5 Indigenous and historic heritage

Cultural Heritage Connections Pty Ltd completed a preliminary archaeology and heritage assessment for the Stage 2 KVAD, comprising a desktop review, a site inspection and consultation with BLALC (Cultural Heritage Connections 2006).

This assessment concluded that the proposed Stage 2 KVAD works pose no threat to the Aboriginal archaeological and heritage values of the study area. Where works are limited to areas of previous disturbance (refer to *Figure 6.2*), it has been assessed that the proposed activity would not result in any further impact on Aboriginal archaeological potential (Cultural Heritage Connections 2006).

No further assessment of Indigenous and historic heritage impacts is proposed as part of the detailed environmental assessment, as this issue has been assessed as manageable given the application of the following recommendations to ensure no inadvertent impact on the Aboriginal heritage values in the area:

- Disturbance to the western-most portion (refer to *Figure 6.2*) of the study area should be kept to a minimum.
- If during the course of development of the area, any objects (as defined in the *National Parks and Wildlife Act 1974*) are discovered, all work should cease and both the DEC regional archaeologist and the BLALC should be notified so that an appropriate course of action can be determined.

In conclusion, heritage impacts are considered to be minimal and are manageable with appropriate and well established procedures. On this basis, no further assessment is proposed as part of the detailed environmental assessment. The above requirements would be incorporated into the Statement of Commitments for the project.

Figure 6.2 Location of surveyed areas and identified areas of disturbance

6.6 Visual impact and landscaping issues

PB has completed a preliminary visual assessment, comprising a viewshed analysis of the Stage 2 KVAD using existing topographic contours to generate a digital elevation model (refer to *Figure 6.3*). The assessment assumed that the existing Stage 1 placement was already at its completion height of 940 metres AHD and that potential viewers were located at 2 metres elevation from ground level. No natural screening was taken into account during this assessment. As a result, the outcomes are considered to be conservative. The assessment concentrated on potential viewers within 20 kilometres of the project.

The viewshed analysis identified that the most significant visual impact is expected to occur at the WWPS. However, as ash placement is part of the operation of this facility, this impact is not considered significant.

Following completion of Stage 2, residents located west and south-west of the KVAD may have a changed view of the ash placement area when compared to the existing situation (refer to *Figure 6.2*).The level of impact would depend on the level of screening from trees and other objects for these properties and would be managed as the project progresses. The overall impact, however, is likely to be limited, as only a small number of residents would be directly affected.

It would be difficult to identify alternative areas for ash placement that would have a lesser visual impact. It is proposed that the visual impact is managed through industry recognised mitigation measures such as tree screening and landscaping, including capping and revegetation, where required.

Community engagement during the Stage 1 operations identified issues associated with operational lighting during night-time ash placement activities. Following identification of these concerns, Stage 1 operations at the KVAD have been modified so that lighting is directed away from residential properties towards Sawyers Swamp Creek Dam, where possible, without jeopardising the safety of the operation. This ongoing commitment would be incorporated into overall site management and environmental management plans for Stage 2 and recorded within the Statemnet of Commitments for the project.

In conclusion, visual impacts and landscaping issues are considered minimal and would be manageable with appropriate, well established procedures. On this basis, no further assessment of visual impacts and landscaping issues is proposed.

6.7 Traffic and transportation

The development of Stage 2 activities would not significantly increase traffic when compared to the existing operations for Stage 1, although operating hours are proposed to be extended to 24 hours a day. This increase would occur on the internal haul road and would not affect the external road network.

This change would result in increased traffic noise, which has been assessed in *Section 6.3* and would be further investigated in the detailed environmental assessment. All other potential impacts relate to traffic movements on the privately-owned and operated haul roads that currently operate with similar traffic movements.

No traffic movements or impacts are anticipated on public roads outside of the site during ash emplacement activities. It is, therefore, anticipated that traffic management would be undertaken in line with existing site management procedures and plans.

A short-term increase in traffic movements on the local road network is expected in association with mobilisation and demobilisation of equipment during construction of the stability berm and realignment of Sawyers Swamp Creek. This would be managed through a construction traffic management plan to be developed and implemented by the construction contractor. This would be incorporated into the Statement of Commitments to be developed during the detailed environmental assessment.

In conclusion, potential traffic and transportation impacts are considered to be minimal and would be manageable through the use of appropriate and well established procedures. On this basis, no further assessment of traffic impacts is proposed as part of the detailed environmental assessment. This issue has been assessed as manageable with existing management and industry accepted procedures.

Figure 6.3 Viewpoints surrounding the Stage 2 Kerosene Vale Ash Dam

6.8 Land use

The placement of ash over the KVAD would be in line with the historic use of the site as an ash placement area. This project has been developed in general accordance with the land use planning objectives of the 1(a) Rural (General) Zone under the *Lithgow Local Environmental Plan 1994* (LEP). Specifically:

- The project would be designed to capture surface water run-off in line with identified flooding, surface water and hydrological requirements. The long-term drainage plan would be further assessed as part of the detailed environmental assessment and mitigation measures developed to ensure effective protection of Sawyers Swamp Creek and the Coxs River.
- The existing bund wall at Kerosene Vale would be buttressed and strengthened to contain the ash storage. This would prevent soil erosion and contamination of Sawyers Swamp Creek.
- The project is located on land previously used for mining; hence it would not impact on valuable deposits of minerals, coal and/or extractive materials as these have been previously removed.

In conclusion, potential land use impacts are considered minor and would be manageable with appropriate and well established procedures.

On this basis, no further assessment of land use impacts is proposed as part of the detailed environmental assessment as there would be no conflict with surrounding land use. This issue has been assessed as manageable with existing management and industry accepted procedures.

7. Proposed scope for environmental assessment of key issues

One of the objectives of the new planning approvals process under Part 3A of the EP&A Act is to produce more focused environmental assessment documents.

On the basis of the preliminary environmental review, the environmental assessment for the project would focus on the key issues that have not been satisfactorily resolved to date. These are:

- hydrology and water management
- air quality impacts
- noise impacts
- community consultation.

The proposed scope of works for these detailed studies is shown in *Table 7.1*.

Table 7.1 Scope of environmental assessment

Issue	Environmental assessment scope
Hydrology and water management (flooding, surface water and groundwater)	▪ Undertake detailed review of site hydrology and the surrounding catchment. ▪ Review groundwater impacts from Stage 1 and possible impacts from Stage 2. ▪ Identify and integrate mitigation measures into the overall design. ▪ Incorporate the DNRs' requirements for rehabilitation of the realigned section of Sawyers Swamp Creek into the design process. ▪ Identify locations for the capture of surface water run-off to minimise surface water run-off to Sawyers Swamp Creek. ▪ Identify opportunities for reuse of captured water within the WWPS. ▪ Assess the whether the proposal would have a neutral or beneficial outcome in terms of local water quality.
Air quality impacts	▪ Collect additional on-site data including: ▸ total suspended particulate matter (TSP) ▸ particles of aerodynamic diameters of less than 10 nanometres (PM10) ▸ additional on-site meteorological data. ▪ Analyse the operation of the KVAD and develop a dust emissions inventory (or inventories). ▪ Identify the relevant air quality assessment criteria based on DEC criteria and the existing background levels of TSP and PM10 concentrations and dust deposition levels. ▪ Model the dispersion of dust emissions and estimate dust concentrations and deposition levels. ▪ Compare the predicted levels with the assessment criteria. ▪ Develop mitigation measures, if required, to minimise impacts on residents.

Issue	Environmental assessment scope
Noise	▪ Undertake field based identification of key environmental noise catchment areas and existing sources of industrial noise and determine the extent and influence of the Stage 1 KVAD operations (auralisation works). ▪ Measure existing ambient noise levels at a statistically representative number of locations. ▪ Establish criteria for assessment with reference to the DEC's *Industrial Noise Policy* (2000) – intrusive, amenity and sleep disturbance noise limits. ▪ Assess noise impacts. ▪ Assess currently proposed mitigation measures for future operations regarding their compliance with the *Industrial Noise Policy*.
Community	▪ Hold an advertised local meeting to advise the community of the project. ▪ Identify a mechanism for reporting and raising concerns. ▪ Distribute a letter to identified stakeholders. ▪ Distribute two newsletters to stakeholders during the environmental assessment. ▪ Advertise within local media to advise the community of the public exhibition of the environmental assessment. ▪ Publicly exhibit the environmental assessment in line with statutory requirements. ▪ Assess possible mitigation measures to address community concerns. ▪ Consider community concerns and issues in the detailed environmental assessment studies. ▪ Develop a Statement of Commitments on the basis of outcomes of the detailed environmental assessment.

8. Bibliography

Cultural Heritage Connections 2006, *Kerosene Vale Ash Dam – Stage 2*, *Preliminary archaeology and heritage assessment*, prepared for Parsons Brinckerhoff, October 2006

Douglas Partners 2001, *Discussion Report on Geotechnical Assessment and Feasibility Study – Ash Disposal Wallerawang Power Station*

ERM Hyder 2002, *Proposed Reinstatement of Dry Ash Placement Kerosene Vale – Review of Environmental Factors*

_____2002a, *Proposed Kerosene Vale, Dry Ash Placement – Planning Brief for Delta Electricity*

_____2001, *Wallerawang Power Station Ash Management, Proposed Dry Ash Handling Facility*

Holmes Air Services 2006, *Review of Existing Air Quality and Scoping Study for Stage 2 Development of Ash Dam at Kerosene Vale*, prepared for Parsons Brinckerhoff, October 2006

Parsons Brinkerhoff 2006a *Preliminary Noise Assessment for Stage 2 Kerosene Vale Ash Dam*, prepared for Delta Electricity, October 2006

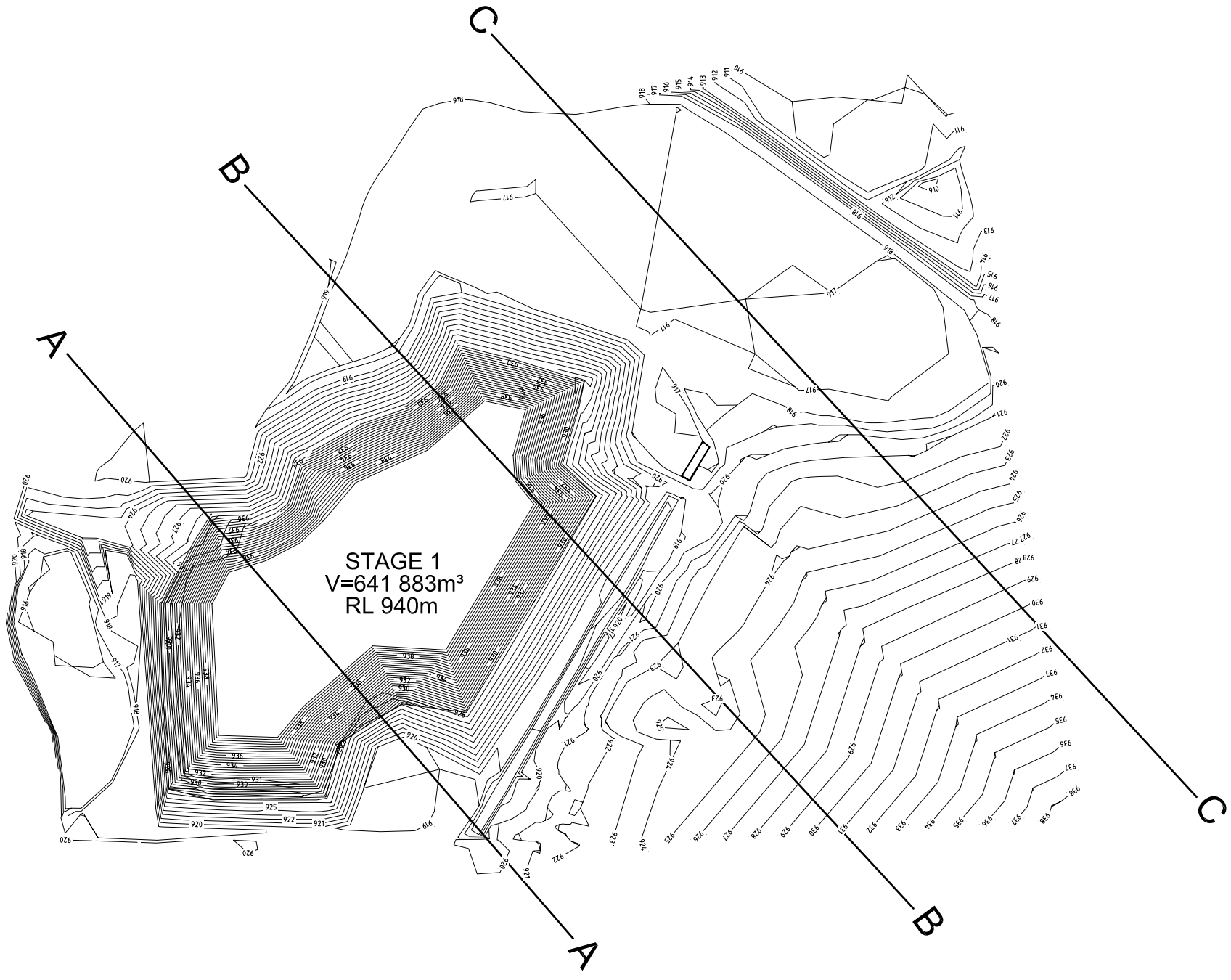
_____2006b, *Preliminary Ecology Assessment for Stage 2 Kerosene Vale Ash Dam,* prepared for Delta Electricity, October 2006

Appendix A

Design drawings

Client: DELTA
Project: Kerosene Vale Ash Emplacement Area
Location: Wallerawang Power Station

PB PARSONS BRINCKERHOFF



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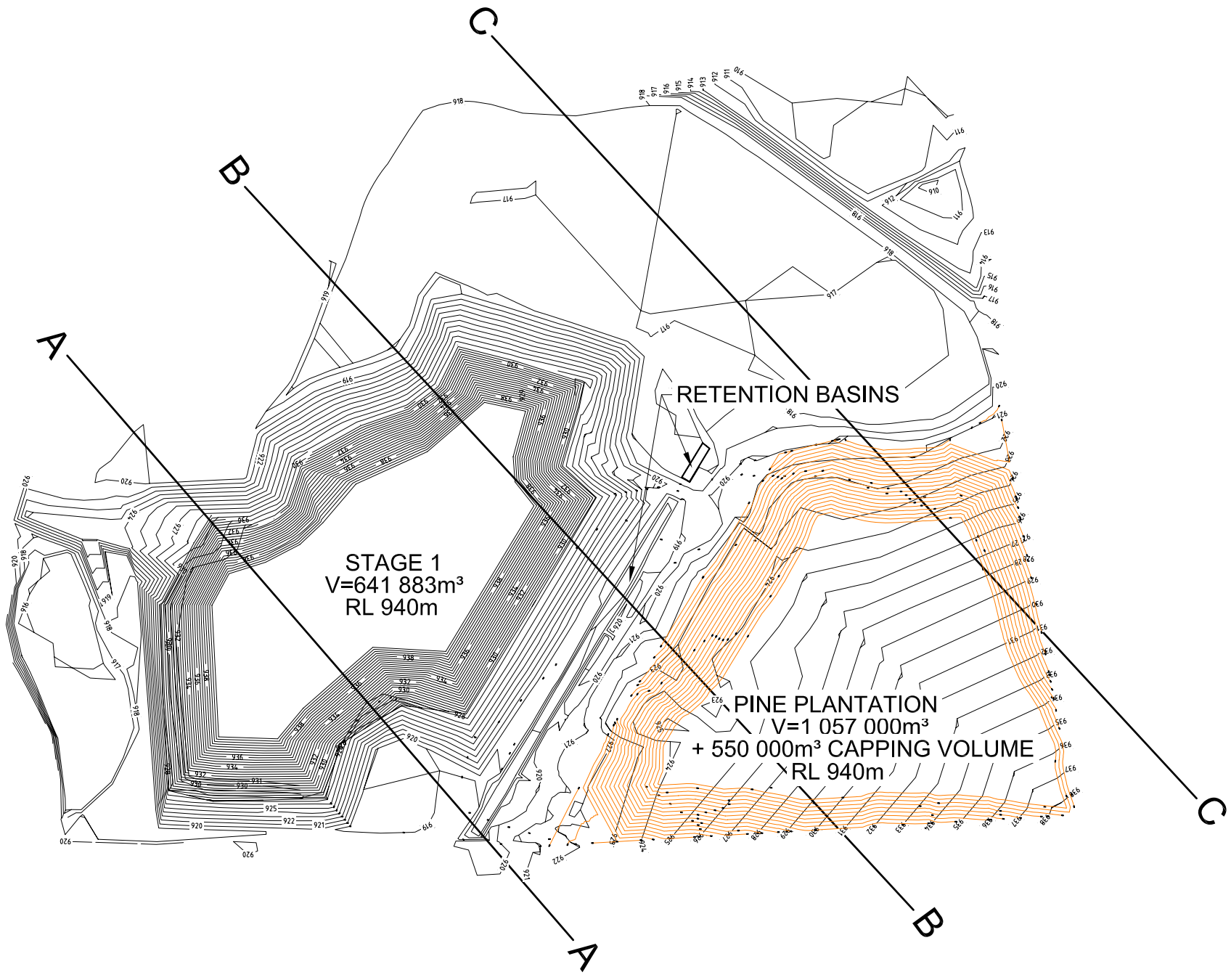
Plot Date: 25/10/06 - 16:04 Cad File: W:\John\Kero Ash\New Figures\Figure 1.dwg

Fill Volumes
Stage 1 Plan

Figure 1

Client: DELTA
Project: Kerosene Vale Ash Emplacement Area
Location: Wallerawang Power Station

PB PARSONS BRINCKERHOFF



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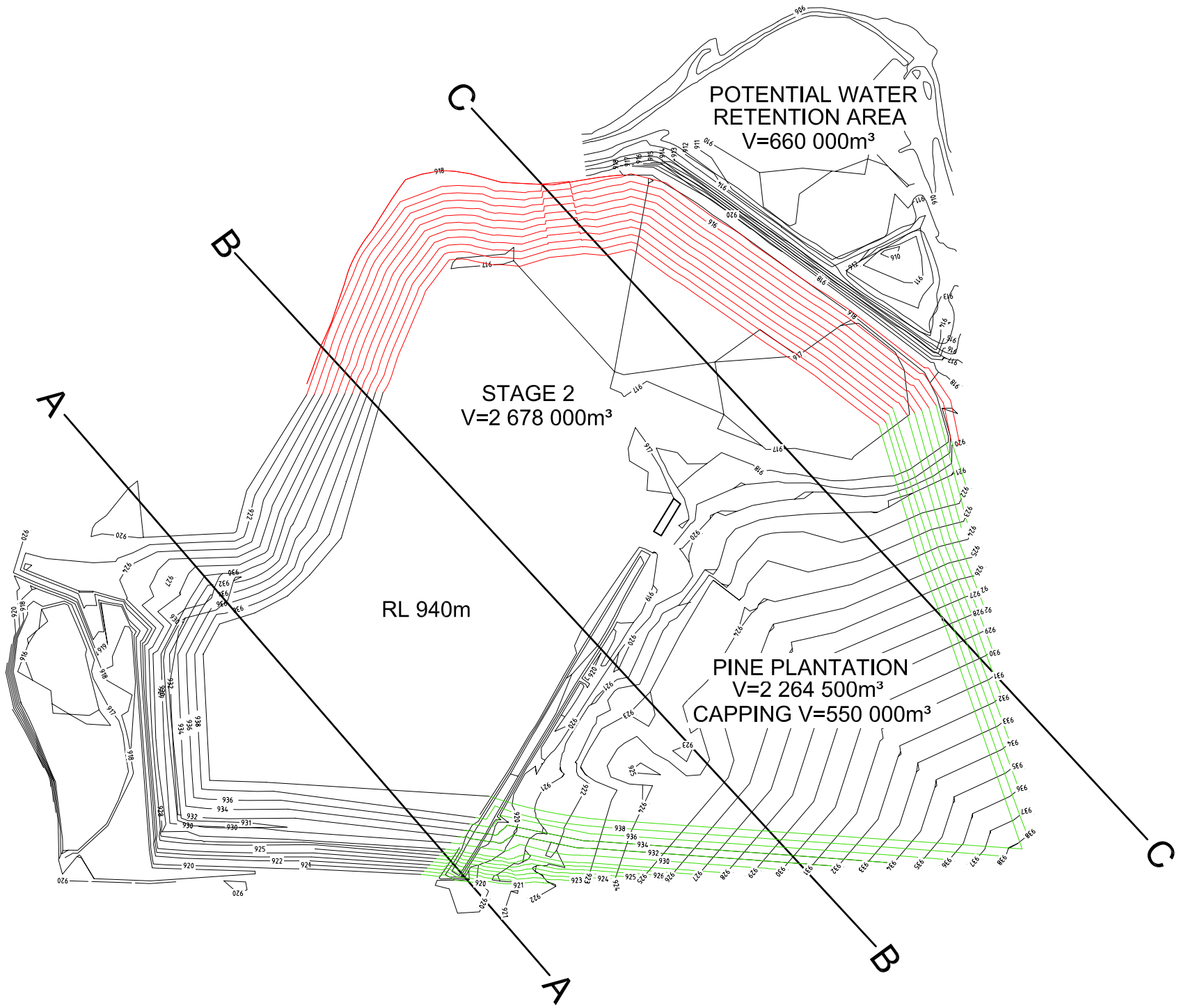
Fill Volumes
Stage 1 and Pine Plantation Plan

Figure 2

Client: DELTA
Project: Kerosene Vale Ash Emplacement Area
Location: Wallerawang Power Station

PB PARSONS BRINCKERHOFF



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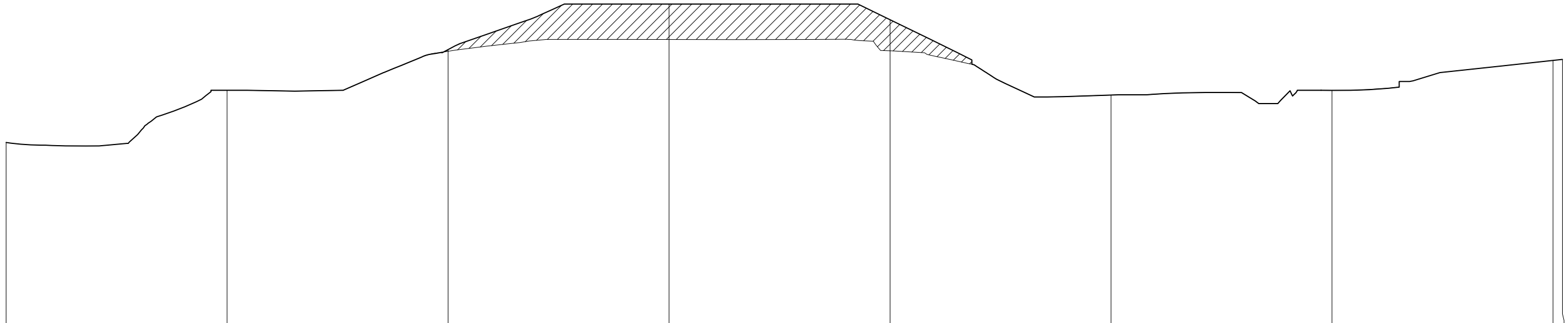
Fill Volumes
Stage 1, Stage 2 and Pine Plantation Plan

Figure 3

Client: DELTA
Project: Kerosene Vale Ash Emplacement Area
Location: Wallerawang Power Station

PB PARSONS BRINCKERHOFF



Vertical Curve Length (m)

DATUM R.L.867.000

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Finished Surface Level	908.217	920.000	929.212	939.500	935.965	918.939	920.000	926.760	926.994
Chainage	0.000	100.000	200.000	300.000	400.000	500.000	600.000	700.000	704.307

STAGE 1 LONGITUDINAL SECTION A-A
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Vert 1:1000

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HORIZ 0 20 40 60 80 1:4000

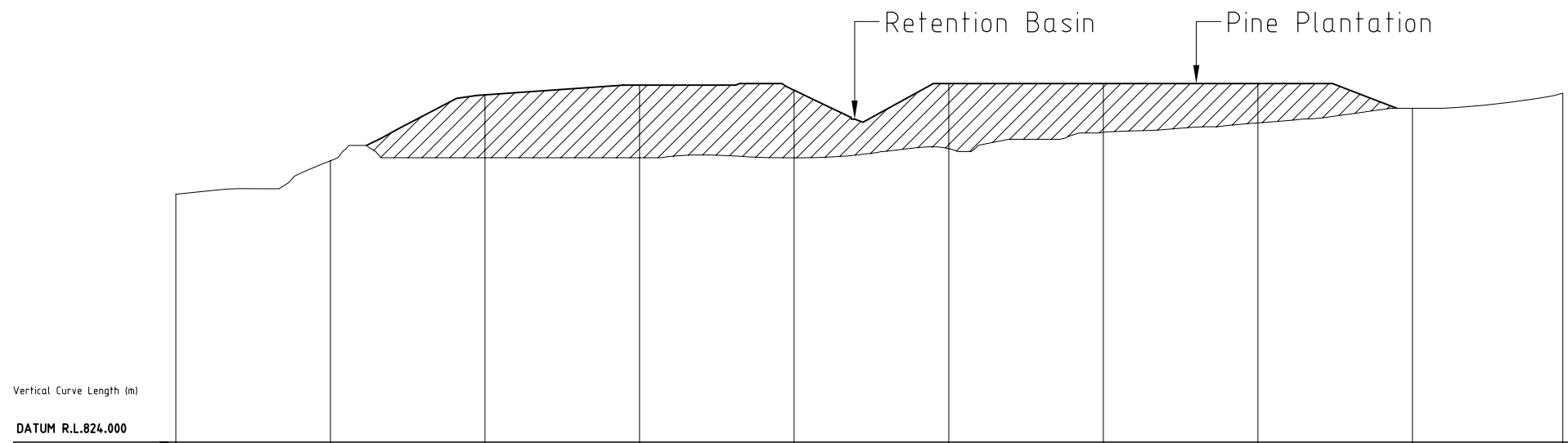
Plot Date: 25/10/06 - 16:06 Cad File: W:\John\Kero Ash\New Figures\Figure 4.dwg

Longitudinal Section A-A

Figure 4

Client: DELTA
Project: Kerosene Vale Ash Emplacement Area
Location: Wallerawang Power Station

PARSONS BRINCKERHOFF



Vertical Curve Length (m)										
DATUM R.L.824.000										
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Finished Surface Level			940.000	940.000	940.000	940.000	940.000	940.000		
Chainage	0.000	100.000	200.000	300.000	400.000	500.000	600.000	700.000	800.000	897.237

STAGE 1 AND PINE PLANTATION LONGITUDINAL SECTION B-B
Hor 1:4000
Vert 1:2000

VERT 0 10 20 30 40 1:2000

HORIZ 0 20 40 60 80 1:4000

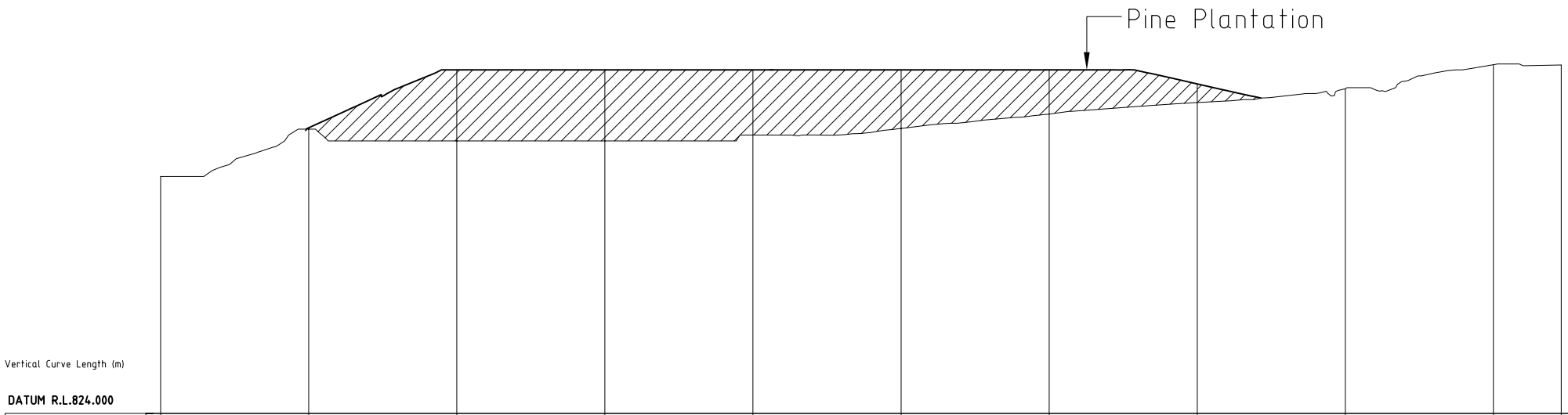
Plot Date: 25/10/06 - 16:06 Cad File: W:\John\Kero Ash\New Figures\Figure 5.dwg

Longitudinal Section B-B

Figure 5

Client: DELTA
Project: Kerosene Vale Ash Emplacement Area
Location: Wallerawang Power Station

PB PARSONS BRINCKERHOFF



Vertical Curve Length (m)

DATUM R.L.824.000

Existing Surface	904.000	920.000	916.000	916.000	918.000	920.195	925.108	928.981	933.599	941.757	941.652
Finished Surface Level		920.456	940.000	940.000	940.000	921.764	940.000	935.266			
Chainage	0.000	100.000	200.000	300.000	400.000	500.000	600.000	700.000	800.000	900.000	945.791

STAGE 2 AND PINE PLANTATION LONGITUDINAL SECTION C-C
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Vert 1:2000

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HORIZ 0 20 40 60 80 1:4000

Plot Date: 25/10/06 - 16:05 Cad File: W:\John\Kero Ash\New Figures\Figure 6.dwg

Longitudinal Section C-C

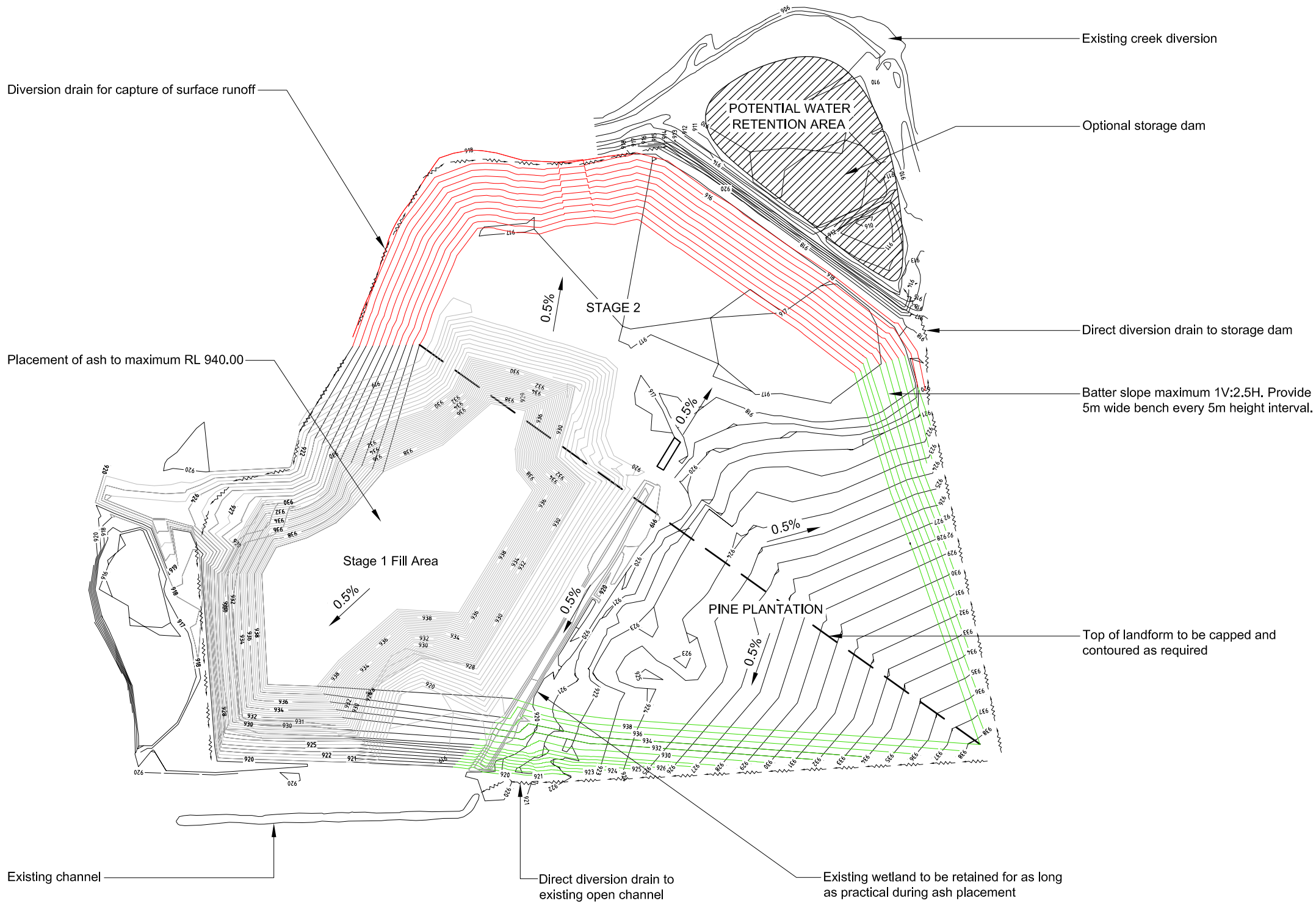
Figure 6

Client: DELTA
Project: Kerosene Vale Ash Emplacement Area
Location: Wallerawang Power Station

PB PARSONS BRINCKERHOFF

Legend:

- Proposed ridgeline
- 0.5% Surface grade
- Diversion drain



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Drainage Plan
Final Landform

Figure 7