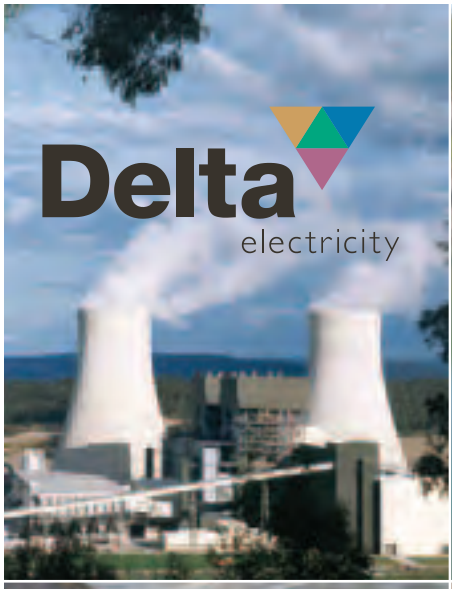

Statement of Environmental Effects

Mount Piper Power Station Extension of Brine Conditioned Ash Placement Area

21 June 2007

Connell Wagner

Document Control

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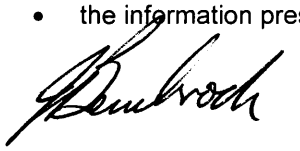
Rev No	Date	Revision Details	Typist	Author	Verifier	Approver
0	10th April 2007	Draft	CW	JB/BH	PF	CF
1	13th May 2007	Final Draft	CW	JB/BH	PF	CF
2	7th June 2007	Final for DoP Review	CW	JB/BH	PF	CF
3	20th June 2007	Final	CW	JB/BH	PF	CF
4	24th Sept 2007	Final Amended to include Lot 8	CW	JB/BH	PF	CF

Declaration

Submission of Environmental Assessment Prepared under Part 4 Section 96(2) of the *Environmental Planning and Assessment Act 1979*	
Prepared By:	Jeffrey K Bembrick
Qualifications	BSc., M.Env.Studies
Address	Connell Wagner - 116 Military Rd Neutral Bay NSW 2089
In respect of	Mt Piper Power Station - Extension of Brine & Ash placement area
Part 4 Division 7 Modification of Consent	
Proponent name	Delta Electricity
Proponent address	Level 12 Darling Park 201 Sussex Street, Sydney NSW 2000
Address of the land on which the activity is to be carried out.	Mount Piper Power Station 350 Boulder Road, Portland, NSW 2847
Property details	LOT 1 DP 325532; LOT 1 DP400022; LOT 15 DP 626299; PART LOT 191 DP 629212; LOT 2 DP 702619; LOTS 362 & 366 DP 740604; PART LOT 10 & LOTS 18, 59, 260 & 261 DP 751636; PART LOT 1 DP 803655; LOTS 1- 8 & PART LOT 13 DP 804929; LOT 1 DP 813288; LOT 1 DP 816420; LOTS 40, 41, 46-52 DP 827626; LOT 1 DP 829065; LOT 21 DP 832446 & LOT 1 DP 920999.
Proposed modification	Extension of the approved area for placement of brine conditioned ash within the existing ash placement area.
Environmental Assessment	☑ A Statement of Environmental Effects is provided.
Certificate	I certify that I have prepared the contents of this statement and to the best of my knowledge: The SEE contains a "description of the expected impacts of the modification" and addresses the requirements notified by Dept. of Planning on 3rd March 2006 and 20th December 2006. As required by clause 115 of the EP&AR, the SEE includes: (a) a description of the development to be carried out under the consent (as previously modified); (b) a description of the proposed modification to the development consent; (c) a description the expected impact of the proposed modification; and (d) a statement to the effect that the development (as to be modified) will be substantially the same development (see section 96(2)(a) of the EP&AA). • the document contains all available information that is considered relevant to the environmental assessment of the proposed modification to which the document relates; and • the information presented is neither false nor misleading.
Signature	
Name and Date	Jeff Bembrick 24 September 2007

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1. Introduction

1.1 Purpose and structure of this document

This Statement of Environmental Effects (SEE) supports an application to NSW Department of Planning for a modification of the development consent for the Mt Piper Power Station. The modification is required to allow for a proposed extension of the approved area for co-placement of brine and ash within the existing ash placement area.

The extension of the brine in ash co-placement area can be undertaken without any significant change to the approved final form of the ash placement area and using existing facilities and methods employed over the last six years. As such the project is considered to represent a minor change and, following implementation, the power station will represent substantially the same development as that approved under for the current consent. Based on that consideration and advice obtained from the NSW Department of Planning (DoP) (Appendix 1) the application for modification of development consent is submitted under Section 96(2) of the EP&A Act, 1979 and is supported by this Statement of Environmental Effects.

The SEE has been prepared by Connell Wagner on behalf of Delta Electricity and provides:

- A review of Mt Piper Power Station generation operations with particular reference to dry ash placement and placement of brine conditioned ash (Section 1)
- Review of the planning context and applicable legislative requirements, including prior development consents, particularly for the ash placement area and brine conditioned ash (Section 2)
- Review of alternatives that have been considered for Brine disposal (Section 3)
- Details of the proposed extension of the brine in ash co-placement area (Section 4)
- Discussion of environmental issues associated with the proposed extension (Section 5)
- An overview of relevant monitoring of surface and groundwater and the results obtained (Section 6)
- Details of groundwater modelling undertaken for the proposed extension (Section 7 and Appendix 6)
- Details of controls to be implemented for the extended brine in ash co-placement area (Section 8).
- Conclusions on the merits and justification for the proposed extension (Section 9).

1.2 Background

The following provides an overview of operations at Mt Piper Power Station relevant to the proposal for extension of the brine and ash co-placement area.

1.2.1 Location of Mt Piper Power Station and Ash Placement Area

Mt Piper Power Station is located approximately 18 kilometres north west of Lithgow (Figure1). The ash placement area is between 1 and 2 kilometres to the east of the main power station buildings and on the southern side of the Lithgow to Mudgee Road. It is bounded by Huon Creek on its eastern side. Figure 2 shows the lands owned by Delta Electricity and land in proximity to the ash placement area that Delta Electricity proposes to acquire as outlined in Section 2.8.

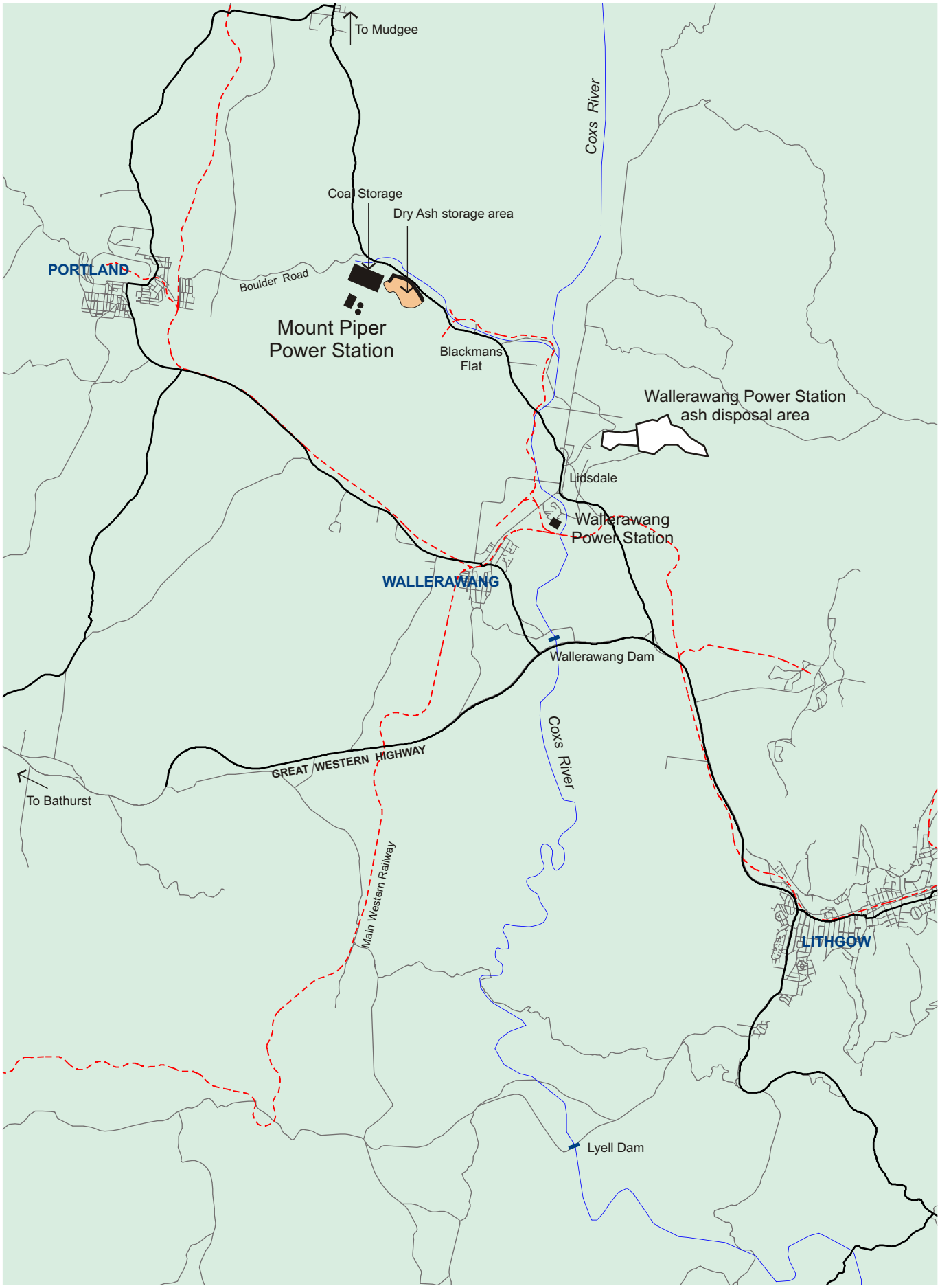

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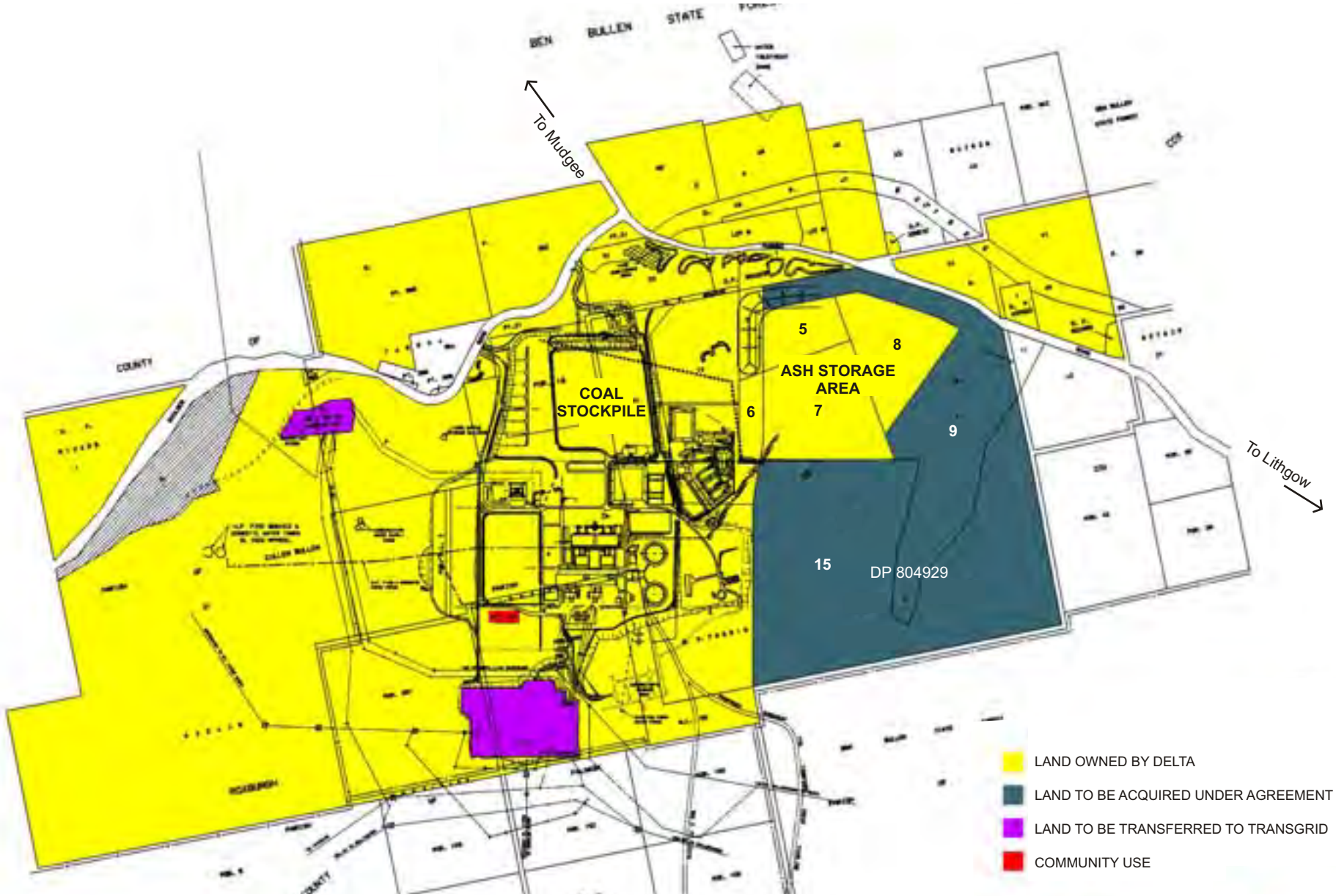
Figure 1

Mount Piper Power Station Location Sketch



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0 0.5 1km

SCALE

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Figure 2

Mt. Piper Power Station Property Ownership

1.2.2 Overview of Power Generation and Ash and Brine Production

Mt Piper Power Station is a two unit coal fired power station that has been fully operational since 1994. The station comprises two generators that were initially approved to operate at 660 megawatts capacity. In 2006, Delta Electricity gained approval to operate the existing equipment at 700 megawatts with a total station capacity of 1400 megawatts. Approval has also been obtained to modify the equipment to enable a further increase in output of each unit from 700 to 750 megawatts with total station generation capacity of 1500 megawatts.

The coal that fuels the power station is about 80% organic material (mostly carbon and to a lesser extent, hydrogen, nitrogen, oxygen and sulphur) and about 20% non-organic mineral matter. Wastes produced during the electricity generation process include flue gas emissions, ash and brine. The nature of these wastes is outlined below with ash and brine being discussed further in the following sections.

Flues gases are predominantly carbon dioxide, nitrogen oxides, particulates and to a lesser extent sulphur oxides. Most of the carbon in the coal is converted to carbon dioxide during combustion. The efficiency of combustion in large pulverised fuel boilers such as are used at Mt Piper means that less than 1% of the carbon in the coal remains unburnt. Unburnt carbon mostly combines with ash material. The flue gases are vented to the atmosphere by tall chimney stacks that assist the dispersal of the gaseous emissions.

Ash is produced during coal combustion by the transformation of the non-combustible mineral matter present in coal. The average ash content of the 2004/05 coal supplies was 22.7%. The annual ash production varies with the level of generation and the ash content of the coal. In future, it is likely that both the generation output of the station and the ash content of the coal consumed will increase, with consequent increase in the annual ash production. Increases in annual ash production will reduce the life of the existing ash placement area but will not alter its final form.

Two types of ash are formed during combustion, these being fly ash (about 90% of the total ash) and furnace ash (about 10% of total ash). These ash products have different physical and chemical characteristics.

Fly ash consists of small particles that pass through the boiler with the flue gas. The fabric filter system, located between the boilers and the chimney stack, captures over 99.9% of fly ash. The fly ash material is a light grey fine powdery material whose particles consist predominantly of silica, alumina and oxygen (about 93.8%) with the remaining 6.2% including at least 26 elements, many at trace element concentrations as shown in Table 1.1. Where possible, fly ash is sold for reuse, including use in the cement industry for blended cement products. Fly ash sales for Mt Piper Power Station are typically about 20% of total fly ash production.

Furnace ash consists of particles that do not pass through with the flue gas but drop to the ash hopper under the boiler. The material is 'slag' like and has a sandy texture. Furnace ash can also sometimes be sold, generally for use as a sand substitute. The furnace ash that is not sold is transferred by truck to the ash placement area and placed independently of the fly ash.

Brine is a product of the Station's water treatment process where salt is removed from the circulating cooling water system so that the treated water can be reused by the station, thereby reducing the Station's demands on local water supplies. More details of brine production and brine composition are provided in Sections 1.2.5 and 1.2.8 respectively.

Table 1.1 - Chemical characteristics of Mt Piper Power Station fly ash

Major Fly Ash Constituents (as Oxides)	Typical Range	As Fired (% by weight)
SiO_2	50 - 85	65.5
Al_2O_3	12 - 40	26.5
Fe_2O_3	1 - 13	1.70
CaO	0.1 - 1.0	0.27
MgO	0.1 - 1.0	0.26
Na_2O	0.05 - 0.75	0.27
K_2O	0.35 - 4.10	2.50
TiO_2	0.5 - 1.3	1.10
Mn_3O_4	0.05 - 0.2	0.03
SO_3	0.05 - 0.40	0.11
P_2O_5	0.05 - 0.34	0.10
		98.3
Trace Elements - from Pacific Power Statement of Environmental Effects (Aug 1999)		
Element		(mg/kg - dry weight)
As - Arsenic		7.7
Ag - Silver		0.14
Ba - Barium		330
Be - Beryllium		15
B - Boron		22
Cd - Cadmium		0.29
Cr – Chromium (total)		52
Cu - Copper		50
F - Fluoride		75
Fe - Iron		6300
Hg - Mercury		0.01
Mn - Manganese		92
Mo - Molybdenum		5.6
Ni - Nickel		40
Pb - Lead		43
Se - Selenium		6.8
Zn - Zinc		56

1.2.3 Extraction of Ash and Fly Ash Conditioning Plant

Fly ash in the flue gases is captured in fabric filter bags contained in large baghouses adjacent to each Unit's boiler. The fly ash is then directed to pipes at the base of the baghouse and pneumatically pumped to an ash conditioning plant, immediately to the east of the station. At the plant, it is conditioned with water or wastewater to give 15% moisture content to facilitate its handling and to prevent dusting during transport and placement. The fly ash is transported by a special 'closed' conveyor (a distance of less than one kilometre) to a nearby abandoned open-cut mine for "dry" placement.

Furnace ash is formed in the station boilers and is extracted from the base, conveyed to the ends of the boiler house building and then transported by truck to the ash placement area and placed separately from the fly ash.

1.2.4 Ash Placement Area

The fly ash and furnace ash produced at Mt Piper Power Station are both stored in the former Western Main open-cut mine void on the eastern part of the power station site, in accordance with the 1990 development consent that was based on the 1989 Environmental Impact Statement (EIS). The former open cut mine removed Lithgow seam that could be economically recovered due to the shallow depth of cover. Underground mining has also occurred where the seam occurred at greater depth below the surrounding hills. Some Lithgow seam coal remains unmined between the areas of open cut and underground mining.

Following transport to the ash placement area by closed conveyor, the fly ash is transferred to haul trucks which place it in the disused mine void where it is spread and compacted using conventional earth moving equipment. Prior to initial placement of ash in the mine void, the bottom of the mine void was covered with mine spoil to a minimum level of RL 908m. The ash was then placed on top of the spoil. This allows groundwater flow from the adjacent areas of unmined Lithgow coal seam aquifer and mined goaf areas to pass through the spoil that occurs below the ash deposit.

Dry ash placement uses less water than the slurry process used with ash dams and is environmentally preferable as it lessens the chance of water seeping into the local ground water. Use of brine for conditioning also reduces the amount of good quality water required for conditioning. The finished contours of the completed and rehabilitated ash placement area were detailed in the 1989 Environmental Impact Statement and are unaffected by the proposed extension of the brine conditioned ash area.

Delta Electricity has advised that about 10 million tonnes of ash has been placed in the ash placement area since commencement in the early 1990s. At the current rate of ash production, the present ash placement area would be filled in about ten years.

As the ash is placed to the desired maximum height, it is covered with mine spoil and progressively revegetated as part of Mt Piper's landscaping program.

The main environmental issues relating to the ash placement area are dust control for exposed ash surfaces, control of any outflow that may contain salts or elevated levels of trace elements and visual screening of the uncapped ash placement.

1.2.5 Overview of Brine Production Operations

Mt Piper Power Station is equipped with an advanced water management system with an emphasis on reuse and recycling. A waste water plant treats water produced in the station that is not suitable for direct recycling and reuse and which cannot be discharged to Neubecks Creek. The treatment process substantially reduces the waste water volume by recovery of good quality water for reuse within the station and concentrates the salts in the residual waste brine.

A large part of the station's waste water is derived from the evaporative cooling process. As part of the process, a proportion of the water passing through the cooling towers evaporates to the atmosphere and the evaporated water is continually replenished. However, the salts contained in the water do not evaporate and, as a consequence, the salt levels in the circulating cooling water increase progressively. Elevated salt levels are undesirable operationally and need to be

reduced. When the salt concentration reaches a predetermined level, some of the water is removed ("blown down") and replaced with fresh water ('make up" water) to reduce the concentration of salts.

Waste water from cooling tower blow down and demineralising and condensate polishing plants as well as excess water from the three ash settling ponds is directed to a brine concentrator via the cooling tower blowdown ponds. The brine concentrator produces low salinity water that can be reused in the station's processes. The Station's treatment of the saline blowdown produces up to 1,400 ML/year of low salinity water that can be reused on site. By treating the saline blow down water and reusing the water produced, the station reduces its demand for fresh water and, avoids the discharge of moderate salinity water to local creeks.

The water treatment process, involving a brine concentrator, removes salt from the waste water and produces a brine waste that has a salinity of between 115,000 mg/L (1999) and 137,000 mg/L (2004/05) (Table 2). The salts within the brine are mostly concentrated constituents of river water. The composition of the brine is described in Section 1.2.8. Temporary storage of the brine is provided by two 20 ML lined holding ponds (total capacity of about 40 ML) until the brine is required for fly ash conditioning (Plate 1).

Brine production at the power station has been about 8 ML per year under normal weather conditions where the region's rainfall maintains the salinity of the Station's water supply sources at normal concentrations of about 215 mg/L. Under the recent prolonged drought conditions, the salinity in the water supply and the cooling tower make-up water has increased to about 335 mg/L. As a consequence, the brine production has increased, up to about 15 ML/year.

1.2.6 Conditioning of Fly Ash with Brine

During the period from 2000 to the end of 2006, about 125 ML of brine has been co-placed with ash, including about 48 ML, which was stored in the brine holding ponds and a contaminated water pond. About 77 ML of brine has been produced since. The annual production of brine has increased from about 8ML/year in the latter 1990s to about 15ML/year in 2005 due to extended drought conditions.

The use of brine for ash conditioning is intermittent and occurs only when the ash is to be directed to the approved co-placement area and also when conditions for use of brine are favourable. The timing for use of brine to condition ash was initially planned to be once every three years (1999 SEE) but is now undertaken during Spring and Summer. The cooler Autumn and Winter months are avoided due to unfavourable operating conditions. The pumping of brine is limited during cooler months by the brine's high freezing point and six months of the year is the maximum time during which brine can be used for conditioning.

Brine is stored in the ponds between co-placement operations. An increase in brine production due to either increased generation or higher salinity of make-up water may reduce the period between co-placement operations.

When conditions are favourable, brine is pumped from the ponds to the ash conditioning plant (Plate 2). At the plant, it is used to condition ash to about 15% moisture prior to the brine conditioned ash being directed to the approved brine and ash co-placement site. Solids that settle out in the brine holding ponds are also co-placed with the ash in the approved area.

1.2.7 Brine Conditioned Ash Handling, Volume Placed and Remaining Storage

The current approved area for co-placement of brine in ash is at the western end of the dry ash placement area, as shown in Figure 3. The brine is essentially immobilised in the pores of the 'dry' ash and not leached out by the relatively low rate of rainfall infiltration.

The brine conditioned ash is only placed above a level of RL 946 metres (Figure 4). The volume up to RL 946 metres is filled with water conditioned ash above a basal layer of mine spoil. The upper surface for the brine conditioned ash follows the contours of the fly ash placement plan up to RL 980 m, the height previously approved by Lithgow City Council in 1990.

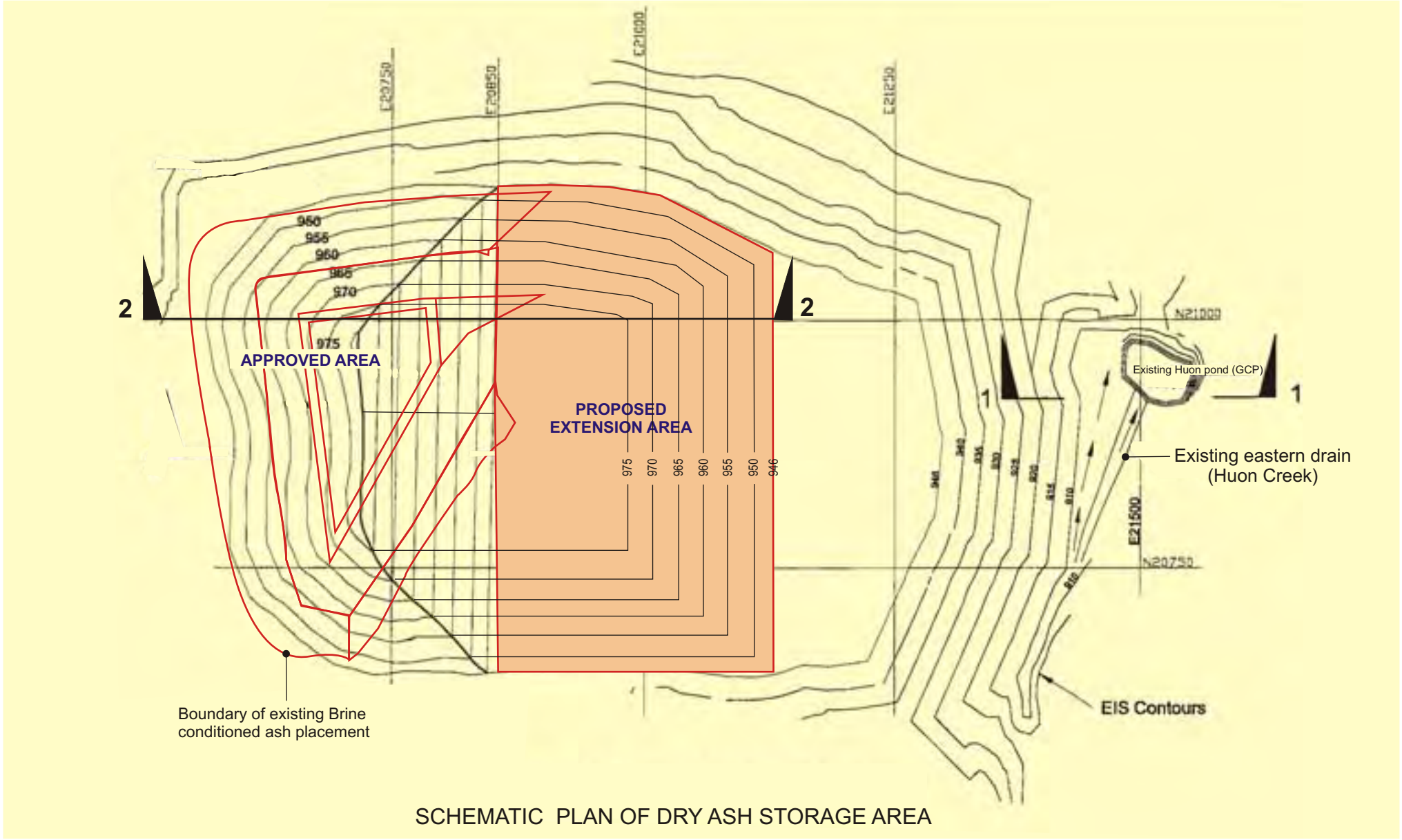
The currently approved brine conditioned ash placement area has a reduced capacity to store brine conditioned ash due to:

- The south-eastern part of the currently approved co-placement area having not been used for brine conditioned ash placement, due to the need to allow vehicle access through this area, thereby reducing the area available for brine in ash co-placement. The future availability of that part of the initially approved area will depend on the practicalities of the placement arrangements and scheduling.
- The placement of some water conditioned ash within the area approved for brine conditioned ash. Such placement usually only occurs for short periods due to operational constraints.
- Also, as mentioned previously, ash conditioning equipment has only achieved a 15% moisture level rather than the 17% proposed in the 1999 EIS. This has meant a greater amount of brine conditioned ash needs to be placed to dispose of the same amount of brine.

The above factors have contributed to the need to increase the extent of the placement area for brine in ash co-placement.

Table 1.2 provides a summary of the calculated volume of brine conditioned ash that has been placed to date and the remaining placement volume potentially available within the existing approved area. The summary has been derived from a site survey arranged by Delta Electricity to assess storage capacity.

As can be seen in Table 1.2, about 1,069,600 tonnes of brine conditioned ash have been placed over the 6 years to end 2005 (representing disposal of about 13 years of brine production). Based on the projected placement rates associated with the likely future brine production rate there only appears to be space for a further 3 to 4 years of brine ash placement within the existing approved area. This is significantly shorter than the period remaining for use of the full placement area and it is therefore necessary to consider an increase in the proportion of the placement area that can be used for brine conditioned ash.



SCHEMATIC PLAN OF DRY ASH STORAGE AREA

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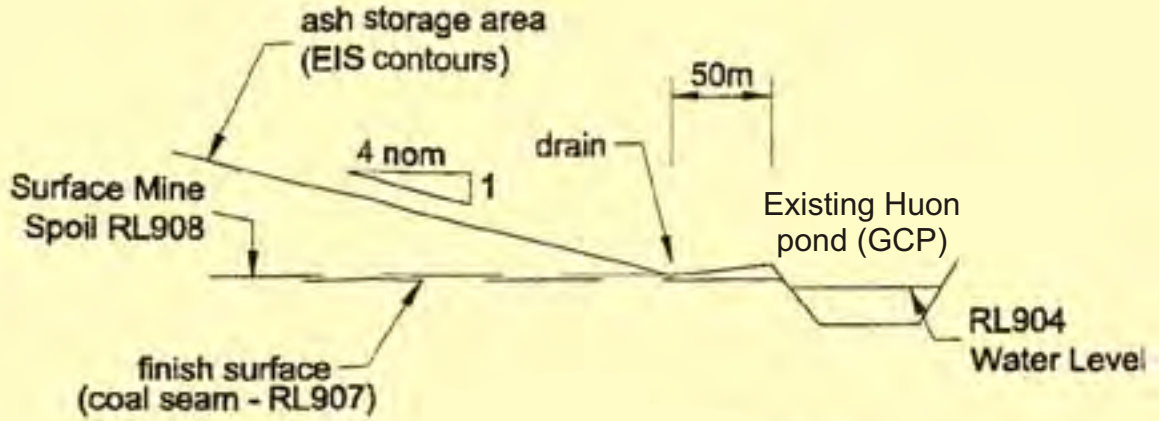
Figure 3

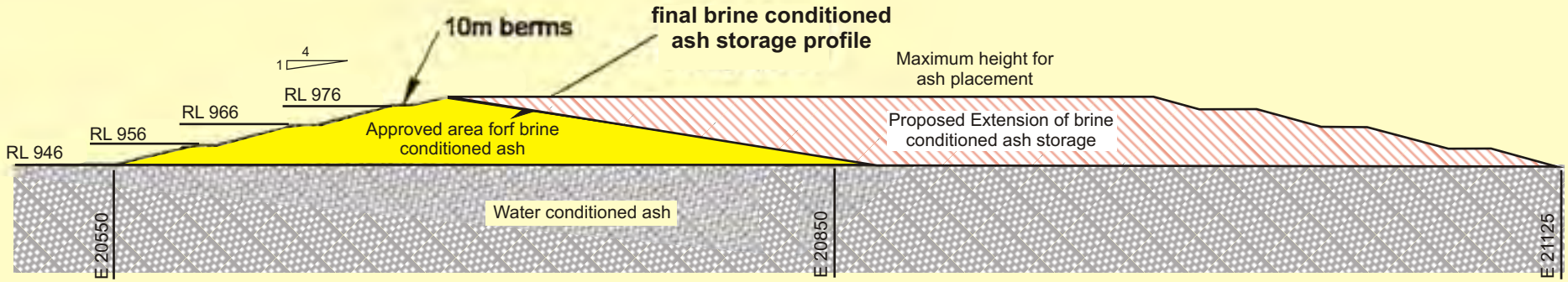
Extension to Brine Ash Deposit Area



NOTE:
Batters to external batters between berms is shown at 1:4, final batters to be 1:5 (without berms)

Details shown are diagrammatical only, final edge of batter to be determined on site and as directed by the Superintendent.

SECTION 1
TYPICAL SECTION THROUGH EASTERN EDGE OF STORAGE



SECTION 2
TYPICAL SECTION THROUGH NEAR FINAL STORAGE

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DIAGRAMMATICAL ONLY

Figure 4

Cross Section of Ash Deposit

Table 1.2 – Summary of Placement Volumes for Approved Brine Conditioned Ash Area

Sub area for brine conditioned ash placement	Brine co-placement Volume (m^3)	Storage capacity (tonnes)	Area (m^2)
Total Approved (1999 SEE)	1,081,000	1,513,600	123,000
Brine conditioned ash already placed (to end 2005) in approved area (Includes some water conditioned ash.)	764,000	1,069,600	123,000
Area excluded by use for haul road	35,000	49,000	
Remaining useable volume (mostly above RL 960 metres height)	282,000	395,000	

The conditioning of ash with water or brine assists the prevention of dust generation at the ash placement site. In addition, a system of sprays (Plate 3) is used to prevent dust by maintaining the surface of the placement area in a damp condition and a mobile tanker is used to control dust on areas not subject to the sprays (Plate 6).

As brine conditioned fly ash placement reaches its desired height, it is covered with one metre of water conditioned fly ash and then covered with a minimum of 200 mm of compacted soil. Revegetation of the soil covered ash will take place as set out in the Mt Piper Power Station Ash Placement and Environmental Management Plan (Mt Piper Ash, 1999). Revegetation of capped areas is progressing but, with the dry conditions that have prevailed in recent years, this has been slower than would otherwise be the case. Spray irrigation has been used to promote revegetation.

As part of the ash placement Environmental Management Plan (EMP), diversion drains are used around each placement stage to collect any surface run-off and direct the water to a 300 m^3 plastic lined detention pond (Plate 4). If sufficient water is collected in the detention pond, it is reused for dust suppression on the brine conditioned fly ash placement site.

Delta Electricity has indicated that an additional detention pond for the extended brine conditioned ash placement area may be required. The location of the detention pond(s) and drains varies as the ash placement progresses. The capacity of the pond(s) may also be varied to suit the extent of the actual area drained by the pond. Accumulated ash in the detention pond and perimeter drains is collected and placed within the brine conditioned ash placement area, as required.

Monitoring of groundwater has been undertaken in bores around the area of brine in ash co-placement and for the water in the groundwater collection basin to the east of the ash placement area. The monitoring results have not indicated any significant movement of brine and the current placement practices will be used for the extension (see Sections 6 and 7).

1.2.8 Composition of Brine

Brine is the salty residue from the station's water treatment process that concentrates the unwanted salts present in the process waters. Its composition is shown in Table 1.3. The salinity of the brine is about three times the salinity of sea water. About 90% of the salts in the

brine are naturally occurring salts derived from the Coxs River Water Supply Scheme. The bulk of the remaining 10% is mainly sodium sulphate derived from additives to the process waters. Some of the copper and nickel in the brine is attributed to leaching of the condenser tubes in the cooling water system.

While the salinity of the water supply to the station has increased due to the current prolonged drought, the salinity of the cooling tower blowdown that is fed to the brine concentrator plant has remained about the same. Due to the increased salinity of the water supplied, there is a need to blow down the cooling system more frequently and an associated increase in the volume of blowdown that needs to be treated.

Monitoring of the brine over time has shown that the concentration of salts in the brine has increased by about 17% from an average of 116,650 mg/L in 1999 to 137,170 mg/L in 2004/05. The increased salinity of the brine is attributable mainly to a number of the brine constituents as described below:

- the sulphate concentration of the brine has increased by about 34%.
- fluoride has increased significantly (six times) from an average of 21 mg/L in 1999 to an average of 126 mg/L in 2003-2006
- boron has increased from an average of 73.6 mg/L to 115 mg/L (55% increase)

The increase in fluoride concentrations in the brine is not expected to significantly increase the ground water concentrations at the ash placement site. This is because over 90% of the leached fluoride is adsorbed onto mine spoil (Pacific Power, 1999) and the modelled concentration in the Groundwater Collection Basin in 1999 was only 2% of the relevant guideline.

In the case of any boron passing from the brine conditioned ash to the underlying mine spoil, about 50% is expected to be adsorbed onto the mine spoil. Additionally the modelled concentrations were an order of magnitude below the guideline.

The nickel concentration in the brine has remained about the same as it was in 1999 at 4.2 mg/L. The modelled nickel groundwater concentration was also an order of magnitude below the guideline in 1999.

Section 6 discusses the results of monitoring in respect of the above trace elements. The results of groundwater modelling and impacts for trace elements are provided in Section 7 and Appendix 6.

Table 1.3 - Mt Piper Power Station - Chemical Composition of Brine

Parameter	Values from 1999 SEE				2003 - 2006
	Minimum	Maximum	Average *		
pH	7.6	8.2	7.9		8.1
Cond (us/cm)	46,500	85,600	63,664		127,982
TDS and Major ions		*(mg/L)*			
TDS	94,340	129,500	116,650		137,170
Alk ($CaCO_3$)	980	1,810	1,360		1,346
Cl	18,000	23,000	19,864		23,889
SO_4	41.600	59,000	49,670		66,767
NA	22,318	29,330	25,678		30,103
K	3,448	4,980	4,258		7,362
Ca	663	844	645		606
Mg	3,360	6,530	5,480		9,010
Trace Elements		*(ug/L)*			
As	386	450	409	^^^	143
Ag	2	<1	1.4	^^	<50
Ba	210	427	272	*	30
Be	-	-	17	^	5.8
B	49,100	95,000	73,560	*	115,000
Cd	16	20	19	+	42
Cr &	30	60	49	+	<50
Cu	5,300	9,900	7858	*	7,197
F	12,800	26,000	21,178	*	125,656
Fe	100	6,030	833	*	-
Hg	1.1	1.6	1.35	^^	-
Mn	12,500	22,500	17,530	*	34,000
Mo	2,450	2,840	2,600	^^	-
Ni	3,100	5,370	4,187	*	4,017
Pb	3.7	9	6	^^	-
Se	30	530	245	*	-
Zn	270	5400	2020	*	-

Notes: Notations relate to Average Trace element values, from 1999 Statement of Environmental Effects

* mostly 10 – 15 analyses (sources Hodgson, 1999) – AWT, 1996

** EPA (1999a) ^ one analysis ^^ 3 analyses ^^^ 5 analyses + 6 analyses

& Chromium is total chromium (CrVI <25ug/l)

2. Planning Context

The power generation operations at Mt Piper Power Station are subject to a range of NSW environmental legislation, principally in relation to planning, environmental assessment and pollution control. The key relevant legislation relating to this project is described in the following sections.

2.1 Environmental Planning and Assessment (EP&A) Act 1979

The application for modification of the current development consent is sought under Section 96(2) of the EP&A Act. It has been preceded by the original power station development consent granted in 1982 and a number of subsequent modifications to it. These are listed in Table 2.1 and summarised in the following sections.

Table 2.1 - Summary of Approvals relating to the Mt Piper Power Station Operations

Date	Details of Consent or Modification	Supporting information
April 1982	Original Development Consent for Mt Piper Power Station by Minister for Planning and Environment	1980 EIS
March 1990	Consent obtained from Lithgow Council for Dry Ash Placement at Mt Piper	1989 EIS
March 1991	Modification of Consent to allow temporary storage of Brine Waste – Expiry date of 30th June 1996	Application of 8th Oct 1990 and supporting environmental information
June 1996	Modification to extend time for temporary storage by four years to 30th June 2000	Application from First State Power to modify consent dated 3rd April 1996
December 1998*	Pollution Control Approval for a brine discharge facility at Wollongong Sewage Plant.	Pacific Power documentation
January 1999	Modification of Consent – Condition added requiring that all necessary approvals be obtained prior to construction or modification	Advice from EPA following introduction of POEO Act
April 2000	Modification of Consent to allow brine co-placement in ash	August 1999 SEE
June 2006	Modification of Consent for upgrade of Power Station to 1500 MW capacity	2005 SEE
May 2007	This SEE supports an application for modification of Consent for extension of brine in ash co-placement area	2007 SEE, this document

* Does not relate to the Mt. Piper site and not under the EP&A Act.

2.1.1 Original Consent, 1982

The original consent for Mt Piper Power Station was granted on 1st April 1982 by the then Minister for Planning and Environment in accordance with Section 101(6) of the Environmental Planning and Assessment Act, 1979. The consent was based on the project description and impacts described in a 1980 Environmental Impact Statement. The original Consent has since been modified in 1991, 1996, 2000 and 2006. The most recent modification of consent was granted in June 2006 for an upgrade of the station from 1320 MW to 1500 MW capacity.

2.1.2 Dry Ash Placement

At the time of the original 1980 EIS for Mt Piper Power Station the ash was intended to be stored in an ash dam. Subsequent to the commencement of construction of the Power Station

the decision was made to adopt "dry" placement. An EIS was prepared in 1989 in relation to "dry" placement of ash on site and in March 1990, Lithgow City Council granted development consent for "dry" ash placement. Dry ash placement was proposed on environmental grounds rather than the ash dam proposed in the 1980 EIS for the power station.

2.1.3 Temporary Storage of Brine

In relation to brine waste the Minister for Planning on 18th March 1991 approved a modified development consent to allow the temporary storage of brine waste. The Consent was based on the documentation "Mount Piper Power Station Temporary Storage of Brine Waste: Supporting Environmental Information Document" dated August 1990 and the application of 8th October 1990. The consent was further modified in June 1996 to extend the period allowed for temporary storage.

2.1.4 Brine in Ash Co-placement

A further modification of the 1982 power station development consent was granted by the Minister for Planning on 3rd April 2000 to enable co-placement of brine waste with ash within a defined part of the ash placement area. The modified consent included an additional 11 conditions (38 to 48 and renumbering of previous 38 to 49) and deletion of a former condition (34). The conditions applicable to the brine in ash co-placement arising from the modification of consent are provided in Appendix 2a.

2.1.5 Proposed Station Upgrade

Consent was granted in June 2006 for a modification of the power station involving an increase in generation capacity from 1320 MW to 1500 MW.

2.1.6 Proposed Extension of Brine in Ash Co-placement

This Statement of Environmental Effects has been prepared to support an application for a further modification of the power station development consent to extend of the area for co-placement of brine and ash.

2.2 Protection of the Environment Operations Act 1997 and associated Regulations

In addition to the above development consents, obtained in respect of Mt Piper Power Station operations including ash placement activities, the site is subject to an Environment Protection Licence issued by the EPA under the Protection of Environment Operations Act 1997.

The Protection of the Environment Operations (POEO) Act, amongst other things, aims to protect the quality of the environment in New South Wales, having regard to the need to maintain ecologically sustainable development. As a means to preventing the degradation of the environment, it promotes the use of mechanisms that promote the reduction to harmless levels of the discharge of substances likely to cause harm to the environment and the monitoring and reporting of environmental quality on a regular basis.

Environment Protection Licence No. 766 has been issued by the EPA under the POEO Act and covers operations at Mt Piper and Wallerawang Power Stations.

Specific aspects of the licence relevant to this proposal are set out below. The licence covers activities that include large scale landfilling. The only monitoring/discharge point listed on the licence relevant to

Mount Piper Power Station is the final holding pond monitoring station on Neubecks Creek and identified as "EPA ID 6".

Condition L1 of the Licence – 'Pollution of Waters' states the following:

"Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997".

Condition L3 and L4 also specify the concentration and volume/mass limits, respectively, for the specified licensed site discharge points. In the case of Mt Piper Power Station, the licence does not provide for any discharges and for the assessment of groundwater impacts, DECC has indicated that it focus on factors including:

- "environmental values of water" affected by the activity
- the practical measures that could be taken to restore or maintain those environmental values
- any guidelines issued by the EPA.

"Environmental values of water" is defined by the DECC to mean the values specified in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000.

This Statement of Environmental Effects refers to ANZECC guidelines as the relevant assessment criteria for local waters. The Sydney Catchment Authority guidelines (see section 2.4) are also relevant to water quality objectives of the Coxs River catchment.

Condition L5 allows disposal of ash and of brine conditioned fly ash at the premises. These wastes must only be disposed of to the ash disposal area at Mt Piper Power Station or in the case of Wallerawang PS (also covered by the Licence) within the ash dam or within the ash dam catchment at Wallerawang Power Station.

Condition O1 requires that licensed "*Activities must be carried out in a competent manner*", including: "*the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity*".

Condition O3 requires that "*the premises must be maintained in a condition which minimises or prevents the emission of dust from the premises*".

Use of brine to condition ash is subject to the power station's POEO licence and requires the above conditions to be addressed in relation to ash and brine, use of brine is also required to be undertaken in accordance with the conditions of the modified development consent and the Statement of Environmental Effects (SEE) (Pacific Power, 1999).

The 1999 SEE showed that concentrations of elements in the brine mostly met the NSW EPA (1999) "Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-liquid Wastes". The only exception was nickel which averaged 4.1 mg/L compared to the guideline of 3.0 mg/L. Based on analysis, including leaching tests the resulting brine conditioned ash was classified as "inert" and was deemed acceptable for placement in the ash disposal area as per the Licence and modified development consent.

DECC has been provided with details of the proposed extension of the brine in ash co-placement area and their comments sought on the proposal. The response from DECC, 7th April 2006, attached as

Appendix 4, indicates that, as an existing licensed activity, the proposal does not trigger a requirement to vary Licence 766 but that EPA is the Appropriate Regulatory Authority (ARA) under the POEO Act.

2.3 Lithgow City Local Environment Plan 1994

Under the Lithgow City Local Environmental Plan 1994 the site is within an area of land zoned Rural 1(a). The proposed extension is neither 'prohibited development' or 'permitted without consent' and, accordingly, consent is required. No additional land is required for the extension of brine in ash co-placement as the proposed extension is wholly within the defined ash placement area for which consent has been previously obtained.

Objectives of Zone 1(a) that are relevant to this proposal are to promote the proper management and utilisation of natural resources by protecting, enhancing and conserving:

- *(iv) valuable deposits of minerals, coal and extractive materials, by controlling the location of development for other purposes in order to ensure the efficient extraction of those deposits,*

The extension does not affect coal resources as these have been removed below the area of the proposed extension. A narrow zone of good quality coal remains below the land adjacent the Lithgow to Mudgee Road on the northern side of the ash placement area. That coal would be difficult to recover economically.

- *(vi) water resources for use in the public interest, preventing the pollution of water supply catchment and major water storages.*

Brine is produced as a waste from a process that produces low salinity water that can be reused by the power station. Use of the treated water conserves local water resources by an amount of about 100 ML/year. Use of brine to condition ash also reduces the demand for fresh water supplies to condition the ash. Measures have also been incorporated into the development to prevent off site impacts arising from the brine in ash co-placement. In addition, monitoring undertaken for the ash placement site will identify any movement of brine elements in groundwater and enable a response to such movement should it be detected.

Details of the proposed extension and potential impacts have been provided to Lithgow City Council and their comments sought. Council's response of 23rd March 2006 is attached in Appendix 3.

2.4 Drinking Water Catchments Regional Environmental Plan No 1

Mt Piper Power Station is located within the Upper Coxs River catchment that is part of the Sydney Outer Catchment Area. The Sydney Catchment Authority (SCA) is a NSW Government agency, formed in 1999, whose task is to manage and protect Sydney's catchments and supply bulk water to its customers. SCA has within its principal objectives to ensure that the catchment areas are managed and protected to promote water quality, the protection of public health and safety, and the protection of the environment.

From 1st January 2007, the State Environmental Planning Policy (SEPP) 58 that related to the protection of Sydney's Water Supply and the Sydney Outer Catchment Area has been repealed. SEPP 58 has been replaced by the Drinking Water Catchments Regional Environmental Plan (REP) No 1 made under the EP&A Act. The hydrological catchment to which REP 1 applies includes the Upper Coxs River sub-catchment.

Amongst other things, REP 1 establishes appropriate assessment criteria for water quality issues. The principal water quality objectives referenced in Clause 8(1a) of REP 1 are as specified in the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000* (*the Water Quality Guidelines*). These criteria have been used by this assessment.

Clause 26 of the Drinking Water Catchments REP 1 requires that a consent authority must not grant consent to the carrying out of development under Part 4 of the EP&A Act on land within the hydrological catchment unless it has considered "*whether the proposed development will have a neutral or beneficial effect on water quality*" and it is satisfied that "*the carrying out of the development would have a neutral or beneficial effect on water quality*". The definition of a neutral or beneficial effect on water quality, as provided in the guidelines, includes containment of potential water quality impacts on the development site.

Clause 28 of REP 1 specifies the circumstances where development needs concurrence of the Chief Executive of SCA and indicates that concurrence is not required where the Minister is the Consent Authority.

The SCA has been consulted in 2006 and 2007, in regard to the proposed extension and any issues that it may wish to raise in respect of these works. The SCA responses are attached as Appendix 5. The most recent advice from SCA of 5th March 2007, noted the introduction of REP 1 and its replacement of SEPP 58 and suggested that the SEE include an assessment of whether the proposal will have a neutral or beneficial effect on the water quality as per the following:

- Consider the Drinking Water Catchments REP 1 and have regards to the water quality objectives detailed in the plan
- Contain relevant studies and plans that address the following:
    - Details of site characteristics and identification of the likely pollutants of concern during construction, operation and decommissioning stages of the proposal
    - Identification of potential impacts of those pollutants on water quality (surface and groundwater) during construction, operation and decommissioning stages of the proposal
    - Detail the on-ground water quality protection measures during construction, operation and decommissioning stages of the proposal along with the performance criteria for each measure and assess whether the water quality measures are sustainable for the periods for which they are expected to be in place. The on-ground protection measures and management practices considered should be based on SCA endorsed "*Current Recommended Practices (CRPs) and Standards*" (listed on the SCA website www.sca.nsw.gov.au and available for inspection at the SCA Head Office at 311 High Street Penrith.) Justification for measures proposed based on considerations other than SCA endorsed "*CRPs and Standards"* should be provided.
    - For each identified pollutant of concern assess the post-activity condition in relation to the pre-activity condition in terms of load and concentration for both wet and dry weather conditions (this will require modelling to be undertaken)
    - Determine and state whether a neutral or beneficial effect on water quality of receiving waters (surface and groundwater) will occur during construction, operation and decommissioning stages of the proposal.

In terms of the above, it is noted that the proposed works do not involve a construction phase as the placement area has been established and the proposal relates only to a change in the area that brine conditioned ash may be placed within the overall ash placement area.

Sections 6, 7 and 8 of this Statement of Environmental Effects provide details of the monitoring and modelling studies undertaken and the controls to be applied for the project.

2.5 State Environmental Planning Policy (SEPP) 33 – Hazardous and Offensive Development

One of the objectives of SEPP 33 is to ensure that, in considering any application to carry out potentially hazardous or offensive development, the consent authority has sufficient information to assess whether the development is hazardous or offensive and to impose conditions to reduce or minimise any adverse impact,

In respect of SEPP 33, the proposed extension requires consideration in terms of potential offensive impacts arising from pollutant discharge rather than hazardous impacts. The development is considered not to be potentially hazardous since the placement of brine in ash does not involve the use or storage of hazardous substances and a Preliminary Hazard Analysis (PHA) is not required.

Under the definitions provided in SEPP 33 'potentially offensive industry' means*:*

'a development for the purposes of an industry which, if the development were to operate without employing any measures to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would emit a polluting discharge in a manner which would have a significant adverse impact in the locality or on the existing or likely future development on other land.'

In the case of the brine in ash co-placement extension it is acknowledged that, if undertaken without controls, there is potential for off site impacts due to possible movement of saline groundwater from the ash placement area. However, controls will be integrated in the project to address the risk including:

- Placement arrangement and drainage controls designed to avoid off site impacts
- Continued monitoring of groundwater and surface waters
- Operation of the site under Environment Protection Licence 776

After consideration of SEPP 33 and DoP publication, *'SEPP 33 Hazardous and Offensive Development Application Guidelines'* it has been assessed that the development may pose pollution potential without the employment of controls to prevent discharge and can be described as potentially offensive. However, the site is currently licensed by the DECC under Environment Protection Licence 776 and the control measures mentioned in Section 8 of this SEE will be employed to prevent discharges from the site. It is therefore considered that the development is permissible and with appropriate controls and licensing does not form an offensive industry.

2.6 Contaminated Land Management Act 1997

The Contaminated Land Management (CLM) Act enables the EPA to respond to contamination that is causing a significant risk of harm to human health or the environment, and sets out criteria for determining whether such a risk exists. The CLM Act gives the EPA power to:

- declare an investigation site and order an investigation
- declare a remediation site and order remediation to take place and
- agree to a voluntary proposal to investigate or remediate a site.

The co-placement of brine in ash represents a use of the subject land, which is approved under the EP&A Act and licensed by EPA. Accordingly, it does not trigger the CLM Act. However, if an off site impact that had potential to result in significant impact were to be identified, that situation would need to be reported to the EPA. The existing development consent conditions provide requirements for monitoring and reporting thereby enabling the objectives of the CLM Act to be met.

The EPA is required to keep a record of current and former sites regulated by it. Information about current sites is referred to councils, who must record and make such information available using planning certificates. It is also expected that details of the ash landfill would appear on the respective Section 149 property certificate(s).

2.7 Commonwealth Legislation

The project involves a modification of the ash placement operations at an existing disturbed site. As such none of the on site activities will trigger assessment requirements under the *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act). In addition, controls applied for the project will aim to avoid off site discharge of any leachate from the ash deposit. Accordingly no off site impacts on matters of national environmental significance are expected. The issue of Temperate Highland Peat Swamps on Sandstone, considered to be an endangered ecological community, has been raised. None are present within the proposed development site and the project will be managed to avoid off site impacts. The ecological community is not known to occur in drainage immediately below the site and as such it would be unlikely to be affected.

2.8 Land Ownership

Mt Piper Power Station and the ash placement area are located on land owned by Delta Electricity as shown in Figure 2.

On the northern and eastern sides of the ash placement area is land (Portion 9) currently owned by Centennial Coal that is intended for acquisition by Delta Electricity. The narrow strip of Portion 9 between the ash placement area and the Lithgow to Mudgee Road contains underlying good quality coal which is unlikely to be feasible for recovery. On the northern side of the Road the neighbouring land is owned by Delta Electricity. Portion 9 to the east of the ash placement area extends to the east of Huon Creek and beyond the current ash placement area.

The land to the south of the ash placement area (Portion 16) and to the east (Sections 11 and 12) are also owned by Centennial Coal and are set aside for mining. It is understood that the mining will be by the open cut method where coal reserves remain and their extraction is feasible. Centennial coal also operates a coal washery on land to the south east of the ash placement area. Wastes from the washery have been placed in the upper part of Huon Creek Valley to the south of the ash placement area.

Delta Electricity's site staff advised that the use of the adjacent land to the south east of the ash placement area for coal mining and associated purposes is understood to be continuing for some time.

Delta Electricity has advised that none of the land affected by the ash placement is Crown Land. The ash placement area includes Portions 5,6,7 & 8 of Deposited Plan (DP) 804929. Acquisition of Centennial Coal land to the east and the north of the ash placement area is understood to be scheduled by Delta Electricity and negotiations have commenced with Centennial Coal.

Table 2.2 - Mt Piper Power Station – Details of property

Lot(s)	Deposited Plan (DP)	Comment
1. Land owned by Delta Electricity on which Mt Piper Power Station and associated facilities are located All land is listed on EPA Licence except for Lot 8 of DP 804929		
1	325532	
1	400022	
15	626299	South of ash placement area. Acquisition proposed.
Part 191	629212	
2	702619	
362 & 366	740604	
Part 10 & 18, 59, 260 & 261	751636	
Part 1	803655	
1-8 & Part 13	804929	Lots 5,6,7 & 8 are the existing ash placement area. The brine ash extn. area spans parts of Lots 5, 7 & 8.
1	813288	
1	816420	
40, 41, 46-52	827626	
1	829065	
21	832446	
1	920999	
2. Neighbouring land owned by Centennial Coal (Agreement between Delta and Centennial Coal) (This land is not included on the EPA Licence)		
9	DP 804929	The Groundwater Collection Basin is on Lot 9
15	DP 804929	This lot not necessarily affected by development

2.9 Consultation with relevant Government Departments

During the planning for the initial brine in ash co-placement, consultation was undertaken with relevant government agencies. The consultation included a Co-placement Strategy Seminar held on 15th October 1998, followed by the 1999 SEE and planning application process and the Department of Planning modification of development consent in April 2000. The Environment Protection Licence has also been amended to address the brine placement.

On 28th February 2006, the NSW Department of Planning (DoP) was contacted to obtain its advice on the process for gaining a modification of development consent and for its assessment requirements in relation to the current proposal. The DoP's response of 3rd March 2006 and further advice of 20th December 2006 is provided as Appendix 1 and includes assessment and consultation requirements. During the period of environmental assessment a modification of the power station development consent was obtained for the upgrade of the Mt Piper Power Station.

As recommended by DoP, liaison has since been undertaken with Lithgow City Council, DECC and SCA. Each organisation was provided with an overview of the proposed extension and their comments sought on assessment requirements. Following initial planning studies and a revision of the boundaries of the proposed extension area the agencies were provided with updated details of the proposed extension area. The Agency responses to the information provided to them are provided in the Appendices as shown below:

NSW Government Agency	Location of Responses
NSW Department of Planning (DoP)	Appendix 1 (a & b)
Lithgow City Council	Appendix 3
Department of Environment and Climate Change (DECC)	Appendix 4
Sydney Catchment Authority (SCA)	Appendix 5 (a & b)

2.10 Consultation with the Community

There are no residences on the land immediately adjacent the ash placement area. The closest neighbour is Centennial Coal whose land is used for coal mining activities. Further away several residences are located about 1.5 km to the east of the ash placement area at Blackmans Flat and at about 4 km at Lidsdale. The consultation undertaken with these stakeholders is described below.

2.10.1 Consultation with Centennial Coal

Centennial Coal extracts coal from lands located adjacent to the ash placement area. A pond (Plate 7) located on Centennial Coal's land within Huon Creek has potential to collect any groundwater seepage from the ash placement as well as seepage from underground mine 'goaf' areas. Goaf areas are parts of the underground mine where many of the pillars have been extracted and the mine roof has collapsed.

Water collected in the pond is able to be reused by Centennial Coal in its washery or, in future, could be reused on the power station site. The land owned by Centennial Coal on which the pond is located has been proposed for acquisition by Delta Electricity.

2.10.2 Rural residential neighbours

The closest rural residential neighbours to the ash placement site are located approximately 1.5 kilometres to the east of the site in locality of Blackmans Flat. The residents at this location have raised the issue of the visibility of the ash placement from their properties. In response to the approach from the neighbours, Delta Electricity has undertaken a review of its ash placement operations to assess whether the impact can be mitigated.

The review has identified that, in the short term, there is little potential to mitigate visual impact, due to the constraints on placement arrangements. However, progressively, over the remaining years of placement, the deposit will be capped and revegetated with the final form being more compatible with the surrounding landscape. Plate 9 provides a view of the ash placement from the Blackmans Flat area and Plate 10 shows a simulated view of the final form of the ash placement from the same location.

In addition, Plates 11 and 12 show the form of the ash placement as viewed from Lidsdale in early 2006 and a simulated view of the final form of the ash placement from the same location.

The issue of the visual impact of the ash placement is also addressed in Section 5.2.2.

3. Alternatives Considered

This application for modification of consent is directed toward enabling an extension of the brine in ash co-placement area. The extension is required to allow for disposal of brine to be produced over the period that the ash placement area continues to operate, approximately another 10 years. Assessment of the remaining capacity available within the approved brine in ash co-placement area has indicated that, particularly with the potential for increased brine production, the approved capacity is insufficient and an extension is required.

Without a suitable disposal option for brine, the Station operation could be constrained, thereby reducing the contribution of an important electricity generation asset.

The 1999 Statement of Environmental Effects for Brine Conditioned Fly Ash Co-placement provided a review of the options for disposal of the brine that is produced as a by-product of the generation activities. These included:

- Brine utilisation
- Ocean disposal
- Co-placement of brine with fly ash

The findings presented in the 1999 EIS in relation to the three options are summarised below, together with the consideration of no disposal option being available for brine.

Brine Disposal by Salt Extraction: The potential extraction and utilisation of salts contained in the brine has been previously investigated and found not to be a feasible option for disposal of the brine. This is due to the high energy involved in recovering the salts and to the low value of the products of the process.

Ocean Disposal: Ocean disposal of the brine is a possibility but requires the transport of the brine to the coast and infrastructure for its handling at the coast. Once disposed the brine will easily be assimilated in the ocean and does not present any on-going management requirements at the site. However, the DECC did not regard ocean disposal as a long term solution and, as an interim measure, approved disposal of brine at Wollongong as described below.

In December 1998, the EPA approved the installation of a brine discharge facility at the Wollongong Sewage Treatment Plant (STP) Licence number 000218. Conditions attached to the approval included that the mixing of brine and effluent for discharge must not exceed 1 part brine in 300 parts of the effluent and that the discharge must cease after 12 months from commencement. The purpose of the approval was to allow for disposal of brine as it approached the capacity of the site's temporary storage ponds and prior to a permanent brine disposal option being adopted.

Brine in Ash Co-placement: The initial investigation into co-placement of brine with ash at Mt Piper commenced in 1989. The rainfall infiltration rate was considered critical to the impact assessment and studies were made at several ash dam sites over several years. Subsequently, a two year field trial of rainfall infiltration in a brine/ash trial pad was commenced in 1996 at Mt Piper. This first trial was undertaken with a mixture of furnace ash and fly ash and 11% water. As the furnace ash has about 50% water, the combined product had moisture content equivalent to about 15%.

Since 1997, furnace ash and fly ash have been treated separately. Both are directed to the ash placement area but are placed separately. Subsequent studies focused on brine conditioning of fly ash alone. To achieve 15% moisture in the brine conditioned fly ash, it was necessary to use about 17% brine as the brine contains about 10% salts and 90% water. This alternative was investigated by modelling salts and trace element movements to groundwater and found to be acceptable.

Two alternative sites were investigated for brine conditioned ash placement, these being referred to as Stage I and Stage II. To date only the Stage I area has been used and the availability of Stage II for future ash placement has not been confirmed. Site options for future dry ash placement beyond Stage I will be assessed separately to the current application for extension of the brine in ash co-placement area at a future date.

The prior impact assessment gave consideration to the interaction of the brine in co-ash placement with local drainage systems and the potential for off site impacts. The strategy developed for placement included an underlying water conditioned ash unit to separate the brine conditioned ash from underlying groundwater. Preliminary modelling indicated that groundwater contamination would be insignificant, provided that appropriate control measures were implemented and that the eastern extent of the Stage I ash deposit was set back about 50 metres from the Eastern Drain.

The proposed extension of the brine in ash co-placement applies only within the existing Stage I ash placement area and the review of its suitability has the benefit of the experience of the brine disposal to date. This includes the results of monitoring, undertaken since commencement of brine conditioned ash placement as well updated modelling that includes the extension area and which has been compared against available monitoring results. The details of the monitoring undertaken to date and the modelling are provided in the following sections.

No Brine Disposal Option: In the event that none of the above options were adopted, the ability to produce brine is limited by the size of the temporary storage on site. Once the storage is filled then the Station requires another option to dispose of further brine.

If the brine concentrator were shut down due to lack of a brine disposal option, the station would have accumulate up to 1,400ML/year of saline ‘blow down’ from the cooling water system. While the salinity of the cooling water blowdown is lower than that of brine (about 3,500 mg/L), its off-site discharge would be inconsistent with catchment management objectives and the station’s zero discharge design.

The operation of the brine concentrator has the benefit of producing up to 1,400 ML/year of reusable water and a reduced quantity of waste albeit with a higher salinity than the ‘blowdown’. The ability to dispose of the brine waste in an environmentally acceptable manner enables continued production of reusable water and reduced demands on the region’s water supplies.

4. Project Description

4.1 Introduction

This section of the SEE describes the details of the proposed extension area, the additional works associated with extending the brine conditioned ash placement operations and an outline of the controls proposed to be applied for the extended area.

The extension of the approved area for placement of brine conditioned ash has arisen due to an increase in the annual volume of brine produced at Mt Piper Power Station. The increased brine production is due to several factors including the extended dry weather conditions prevailing in Central Western NSW and to a lesser extent an increased generation output.

Production of brine at Mt Piper Power Station enables reuse of up to 1,400 ML/year of treated water on-site and avoids discharge of the otherwise saline water blown down from the cooling system. However, an environmentally acceptable means of disposing of the brine waste is required in conjunction with the water treatment process. The brine storage ponds at the station provide temporary storage that is limited to 40 ML, equivalent to about two to three years' brine production.

Following review of the options for brine disposal (Section 3) and with the experience of brine conditioned ash placement since 2000, Delta Electricity has confirmed that brine is a suitable replacement for some of the water that was previously used to condition the fly ash and that use of brine for this purpose has reduced the amount of fresh water needed to condition the ash.

As the existing approved area for brine conditioned ash storage has inadequate volume for the projected brine conditioned ash that would be produced during the remaining period of ash placement at this location, an additional area is required. The proposed extension will enable on-site brine disposal associated with the ongoing operation of the power station up until the existing dry ash placement area is nearly filled and an alternative site can be established. The proposed extension, which is shown in Figure 3, will provide adequate volume for placement of brine conditioned ash over the remaining life of the ash placement area.

4.2 Details of Proposed Extension

The proposed extension area is within the total ash placement area and is shown in Figures 3 and 4. It abuts the existing approved brine conditioned ash placement and will be confined to the levels between 946 and 980 metres. The brine conditioned ash will be totally surrounded by water conditioned ash which in turn will be capped by mine spoil and revegetated.

Table 4.1 shows the area and volume for each of the approved and proposed extension areas. The initial area approved for co-placement covered an area of approximately 123,000 m^2. A further area of 130,000 m^2 is sought as an extension of the brine conditioned ash placement area giving a total area of 253,000m^2. It is noted that brine conditioned ash placement will occur only between RL 946 metres and 980 metres with the area of this placement reducing with height in the deposit, due to the overall form of the deposit having a nominal 1:4 slope on its upper sides.

On a volumetric basis, about 1.14 million cubic metres of brine conditioned ash and, where relevant, capping have been placed to September 2006. The volume of the approved and extended ash

placement area has been assessed by surveyors in September 2006 and a further 2.5 million m^3 is estimated to be available in the remainder of the existing approved area plus the proposed extension area. A density factor of 1.4 tonnes per cubic metre has been used by the contractor in the design of the ash placement area.

The proposed extension for the brine conditioned ash placement provides more space than the estimated storage requirements for brine conditioned ash during the remaining life of the ash placement area. This approach has been taken due to the uncertain future weather conditions and associated difficulties in predicting the exact quantities of brine to be produced and in recognition of the practicalities of placement that can result in constraints on the flexibility of placing water and brine conditioned ash.

The proposed extension area has been sized to ensure adequate storage for a high brine production scenario and it is unlikely that the total volume will be required solely for brine conditioned ash. Importantly, the arrangement recognises the original design parameters. It restricts brine conditioned ash placement above a significant thickness of water conditioned ash, is consistent with the approved form for the ash placement and it avoids the eastern end of the overall placement area, which is closer to Huon Creek.

Table 4.1 – Volume of the Approved and Proposed Extension Areas

Brine conditioned ash placement	Area		Brine conditioned ash (m^3)	Capping (water conditioned ash & mine spoil (m^3)	Total Volume (m^3)
	m^2	ha			
Approved area < 960m	123,000	12.3	Existing placement < RL 960 metres		1,140,000
Approved Area > 960m			No placement > RL 960 metres yet		365,000
Sub-total Approved area			1,081,000 *	424,000 *	1,505,000 *
Extension Area being sought	130,000	13.0	2,342,000 ****	900,000 est. ***	3,242,000 **
Total for approved plus proposed extension area	253,000	25.3	3,423,000	1,324,000	4,747,000

Notes: * as per 1999 SEE. ** Surveyors calculation September 2006.
*** estimate of capping **** by difference

4.3 Details of ongoing ash placement operations

The proposed operational activities associated with the extension area are essentially of the same type as have been used for the brine conditioned ash since 2000. Future placement of the brine conditioned ash within the proposed extension area will build on the placement that has already occurred at the western end of the area approved for dry ash placement.

The movement of the brine from the temporary storage ponds at the power station to the conditioning plant and subsequently as brine conditioned ash to the placement area remains unchanged. The brine is pumped via pipeline from the storage ponds to the ash conditioning plant. The plant to condition the ash is the same as has been used to date and the rate of ash conditioning remains the same. The ash conditioning plant is located on a concreted pavement that has drainage to the station's contaminated water system. Potential spills of brine are managed by having the location of the brine conditioning plant, pump and pipeline in drainage areas where potential spills can be intercepted and the water/brine recycled.

The conditioned ash is transported by the existing closed conveyor to a loading bin adjacent to the ash placement area. Trucks then take the conditioned ash to the designated locations where it is to be placed within the placement site. Brine conditioned ash is only directed to designated placement cells within the approved area. The brine conditioned ash is spread and compacted by heavy machinery and capped with water conditioned ash once it reaches the upper level for placement. The final form (Figure 5) as previously approved involves capping with mine spoil and revegetation.

The main variation to the brine conditioned ash placement operations will be in the modified placement arrangements at the ash placement site. This will require re-scheduling of placement to address the extended area for brine conditioned ash placement and modifications to internal drainage and run-off collection. The concept remains the same with the brine conditioned ash to be encapsulated by water conditioned ash through restrictions of its vertical and lateral boundaries.

The placement of the brine conditioned ash is undertaken by the Delta Electricity's Site Contractor in accordance with its contract with Delta Electricity and the Engineering, Environmental & Safety Management Plan for the Ash Placement Area.

The design for the brine in ash co-placement area comprises the following elements:

- Base of brine conditioned ash placement at 946 metres with water conditioned ash below 946 metres
- Maximum height for brine conditioned ash placement at 980 metres. Consequently the brine conditioned deposit will have a maximum thickness of 34 metres at its full development
- On the edges the ash placement upper surface slopes in accordance with the required form of the placement area as summarised below:

  – Nominal slope of 1 in 4 for 40 metres horizontally (ie 10 metres lift)
  – A 10 metre wide berm with a 0.5 metre drop to cater for water run-off

The brine conditioned ash is only directed to defined cells within the approved area for co-placement. However, some water conditioned ash has been placed in the initial area approved for brine conditioned ash. Similarly due to the practicalities of ash placement operations, some water conditioned ash could also be placed in the extended brine ash placement area.

The brine co-placement arrangements include dust and drainage controls. These include dedicated placement cells, sprays (Plate 3) to prevent dust generation from the exposed ash surface during dry and or windy conditions, defined drainage to collect any run off or groundwater seepage (Plate 4), a system to return collected runoff to the co-placement area (Plate 5) and mobile watering plant to control dust beyond the area of the sprays (Plate 6).

Under the site management plan, the brine conditioned ash placement area is managed for collection of rainfall runoff in perimeter drains and a lined collection pond. Surface run-off collected in the existing lined detention pond is reused for dust suppression. The existing lined detention pond was sized at 300 ML (Plate 5) to collect 90% of rainfall runoff events from the brine conditioned fly ash placement area. Delta Electricity has indicated that a second detention pond will be installed in recognition of the larger area associated with the extension. The ash placement area is designed so that surface runoff from the ash placement is contained on site.

The surface contours of the completed ash placement area will be essentially the same as those shown in the 1989 Environmental Impact Statement for Ash Storage (ECNSW, 1989) (Figure 5). The

only difference will be some minor modification to limit the eastern extent of the ash deposit to 50m from the Eastern Drain (Huon Creek), which was proposed in the brine co-placement Statement of Environmental Effects (Pacific Power, 1999). A groundwater collection basin is maintained in Huon Creek and has pumps installed to enable reuse of this water. It is currently used for coal treatment plant purposes.

4.4 Future Brine Operations

This section provides information on potential variations in future brine operations. The annual quantity of brine produced is in proportion to the station's generation output and the salinity of make-up water and is projected to increase.

The approved increase in the station's generation capacity, from 1320 MW to 1400 MW and, following upgrading to 1500 MW, will result in an increase in production of both ash and brine but these are generally in proportion. The 23% increase in electricity production associated with the proposed plant upgrade is expected to increase the brine production from the water treatment plant (with normal rainfall patterns) from 8 ML/year to about 10.5 ML/year, which will be matched by a similar or greater rate of ash production.

However, drought conditions over recent years have resulted in increased salinity of make-up water and correspondingly increased the annual brine production up to about 15 ML/year in 2005. Under drought conditions and with increased electricity production following the upgrade the annual brine production has been projected to increase to 16 to 17 ML/year.

The production of additional brine will require an increase in the frequency of brine conditioned ash placement and will also increase the proportion of brine conditioned ash within the overall ash placement area. However, the final form of the ash placement will be essentially unchanged from the approved form (Figure 5).

The rates of water conditioned ash and brine conditioned ash placement will be managed under a modified EMP for the site that recognises the proposed increased generation and associated ash placement, extended brine conditioned ash placement area and the possible effects of drought.

Environmental controls will include the use of sprays and watering to prevent dusting, surface water runoff drains and two lined water retention ponds within the brine conditioned ash placement area as well as continued monitoring to confirm that impacts are effectively controlled.

The water quality monitoring program that has been undertaken for the co-disposal operation to date will be continued and results periodically assessed (Section 7).

Overall, the proposed extension as described above and undertaken with modified controls, is considered to represent a "minor change" to the existing operations and could be considered as "substantially the same development" as currently approved.

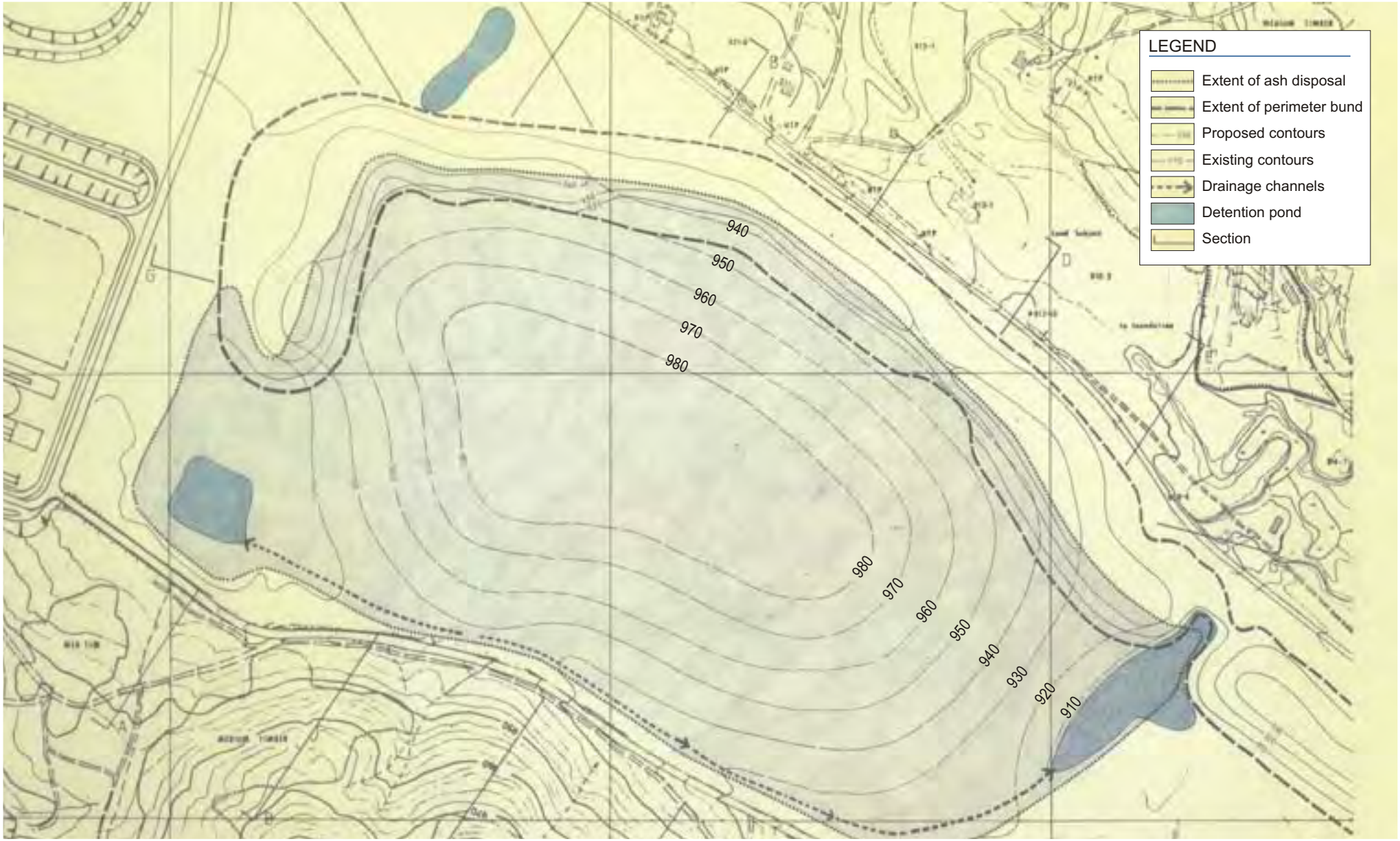

Figure 5

Dry Ash Placement Final Form

Source: EC NSW November 1989 Mt Piper Ash Storage EIS

5. Environmental Issues Management

This section of the Statement of Environmental Effects reviews the environmental issues associated with the proposed extension of the brine in ash co-placement area. An overview of water quality issues is provided in this section, with more detail in the following sections as described below.

5.1 Water Quality Issues

The principal environmental issue for this project is considered to be the containment of the brine within the deposited ash and any potential for changes to the salinity or trace element composition of surface or ground waters surrounding the ash placement area. Accordingly, this SEE provides a review of the impacts associated with the current operations, as indicated by monitoring undertaken to date, and predicts future impacts arising from the extension of the co-placement area.

Reviews of monitoring, groundwater modelling results and management controls related to water quality issues are set out in the later sections of this document as follows:

- Results of monitoring undertaken to date and a summary of relevant findings (Section 6)
- groundwater modelling assessment for the proposed extension of the brine and ash co-placement area (Section 7)
- management controls to be implemented to mitigate any potential impacts (Section 8)

5.2 Other Environmental Issues

Other environmental issues that have been considered by this Statement of Environmental Effects and the potential impact status are described below. The review of issues also considers proposed mitigation measures.

5.2.1 Air Quality

The placement of fly ash and furnace ash has potential to generate dust and, accordingly, requires controls to mitigate the potential.

The site is subject to EPA Licence 766, which includes requirements for site management. Licence Condition O3 requires management of the site to minimise or prevent the emission of dust from the premises. A range of measures have been implemented by Delta Electricity and its Contractor to ensure compliance with the condition.

The arrangements for placement of the fly ash mean that it can be exposed for a considerable time prior to its capping. Once the ash is placed to its final contours it is capped with mine spoil and vegetated, thereby avoiding any further risk of dust generation. However, ongoing management of the exposed ash is required until the final surface has been capped and stabilised with vegetation.

Initially, the fly ash is conditioned with water or brine such that its moisture content is about 15% which minimises potential for dust generation at the placement site. However, in hot dry windy conditions, the surface of the ash can dry out and additional measures are implemented to control dust generation as follows:

- application of sprays to wet the ash surface and prevent dusting. Any runoff from the ash placement area is contained in ponds within the ash placement area and used for this purpose.
- Suitably approved surfactants may be used for temporary capping and dust control
- A water truck is also used on haul roads (Plate 5)

The contractor maintains the dust control measures as the placement progresses. Observations of the site indicate that the measures are effective.

Where practical, the exposed area of ash is minimised to reduce the potential for dust generation and reduce the area requiring application of dust control measures. However, limitations in reducing the exposed area relate to the practical placement arrangements and consequently the exposed area can be large, thereby requiring significant effort to control dust generation potential.

5.2.2 Visual Impact

The uncapped ash deposit is light-grey in appearance and contrasts with surrounding bushland areas. Much of the placement area is concealed from views from the main road that passes the site. However, as the deposit has increased in height, parts of it have become more visible. Views of the ash placement area are provided in Plates 8, 9 and 11 from various locations. Two simulated views following capping and revegetation are provided in Plates 10 and 12.

The ash deposit is progressively capped as sections of the deposit reach their final height, thereby reducing the visibility of the ash placement. However, due to the current smaller area allowed for brine conditioned ash, its height has increased faster than the broader area allowed for water conditioned ash placement and increased the visibility of this part of the placement area. To address this issue, Delta Electricity is reviewing its ash placement arrangements such that more water conditioned ash may be directed to the eastern end of the placement area, capped and revegetated to provide the required site screening of views from the east. Construction of this mound would reduce the visibility of the placed ash from the closest neighbouring residences and the main road to the east of the site.

In the short term the availability of an extended area for brine conditioned ash placement will defer the need to elevate the placement in the existing approved area. Accordingly use of the extended area can reduce the visual impact of the placement area by allowing more time to establish the screening mound at the eastern end of the deposit.

The extension of the brine co-placement area within the overall placement area will make no change to the overall final form of the fly ash placement mound. Water sprays will be used to suppress the dust potential which, if uncontrolled, could result in visible dust plumes and reduced atmospheric clarity. Overall, the proposal when implemented in conjunction with the proposed controls is not expected to result in any increased long term visual impact from the power station's ash placement operations and may assist mitigation of the current visual issue.

5.2.3 Noise Impact

The proposed extension does not require any equipment additional to that already used at the ash placement site. Some additional use of sprays may be required to control dusting and would result in low levels of noise at the placement site. Due to the distance from nearest residences, the low levels of noise involved with these sprays and the fact that the same operations will be involved, there will be no additional noise impacts for the local community.

5.2.4 Flora and Fauna Impacts

The extension is wholly within the area of existing ash placement and, accordingly, does not require any vegetation clearing. The project will be managed to prevent seepage or surface run off from leaving the site and impacting off site areas as described in the following sections. Provided the controls on dust generation and drainage are effective, the extension of the brine co-placement area will not have any impacts on local flora and fauna values.

It is noted that revegetation of the capped deposit will provide the stabilisation of the final landform. The effectiveness of revegetation of the final landform will be monitored as part of the Station's Environmental Management Plan (EMP).

5.2.5 Aboriginal Heritage

The extension of the brine in ash co-placement area is wholly within the existing ash placement site and above water conditioned ash. As such, the placement of brine conditioned ash does not involve disturbance of any deposits that could have indigenous heritage values. Given the prior assessment of the locality and that no new areas are disturbed, no heritage assessment has been undertaken as part of the investigations for the SEE.

5.2.6 Traffic Movements

The project involves on site co-placement of brine and ash. The ash disposed on site is excess to ash that is sold and removed off site. Sales of fly ash from Mt Piper represent about 20% of the total fly ash produced on site. This means that, at present, 80% of fly ash produced is directed to the ash placement area. Delta Electricity has an ongoing program to pursue further opportunities to sell the ash produced by its generation operations. Increased ash sales provide additional income to the station and reduced costs associated with the ash placement operations. Should sales increase, additional traffic would arise due to transport of ash off site. However, this is independent of the proposed extension of the area available for co-placement.

In terms of the fly ash placement operations, haul trucks only operate within the ash placement area between the receival area at the end of the closed conveyor and the placement site being used at the time. The disposal of these wastes on site avoids the need to transport the wastes on public roads. Accordingly, on-site disposal of brine and ash has no impact on road safety or damage to local roads.

5.2.7 Socio Economic Considerations

Mt Piper Power Station is a significant contributor to the National Electricity Market (NEM) and an important component of Delta Electricity's generation assets. The Station (including the associated ash placement facility) is a significant employer in the region through its core staff, contractors and consultants and indirectly through support businesses.

The confirmation of an acceptable means of managing the brine by product of electricity generation is required for continued operation of Mt Piper Power Station. The on-site placement of brine has been assessed as the least cost option for brine disposal while avoiding a number of off-site impacts and risks. The production of the brine also yields low salinity water that can be reused on site, thereby reducing demand on local water supplies by Delta Electricity by about 100 ML/year.

The effective environmental management of the ash conditioning using brine, as documented in this Statement of Environmental Effects, is an important component of ensuring that adverse impacts are not experienced by the broader community.

6. Water Quality Monitoring

6.1 Background

A key issue for the co-placement of brine and ash is to ensure that the brine is essentially immobilised within the ash deposit so that there are no significant impacts on the local groundwater or surface water quality. As set out in the 1999 brine co-placement SEE, this outcome is supported by the uptake of the brine in the ash pores, the effects of mine spoil adsorption should leachates reach the groundwater table within the mine spoil under the ash placement and the placement and drainage arrangements. In addition, the design provides for groundwater from adjacent areas to pass below the ash deposit, thereby avoiding potential leaching by that source of groundwater.

Monitoring of groundwater and surface water is an essential part of the Water Management Plan (WMP) for the ash placement area and formed part of the consent conditions made on 3rd April 2000. The consent included conditions relating to the water monitoring program as follows:

- Monitoring to be based on the programs presented in the 1999 Statement of Environmental Effects
- Consultation with EPA, DNR (formerly DLWC) and SCA prior to brine conditioned ash placement in regard to requirements for monitoring
- Water quality testing at a minimum frequency of every three months
- Expanded groundwater and surface monitoring programs, including if so required, the establishment of additional groundwater monitoring bores and surface sampling points, in accordance with any reasonable requirements of the EPA, DNR or SCA.

In addition the Consent Conditions included a requirement to submit to the Director-General, EPA, DNR, SCA and Council an Environmental Monitoring Report (EMR) on a yearly basis with the first to be submitted no later than six months after the first placement of brine conditioned ash. The EMR was required to include the following:

- Summary and discussion of all available results
- A discussion of the aims of the Water Management Plan and to what degree these aims have been attained in the context of the results and analyses of the Water Monitoring Programs
- Actions taken or intended to be undertaken, if any, to mitigate any adverse environmental impacts and to meet the reasonable requirements of the Director-General, EPA, DNR, SCA or Council.

Delta Electricity's response to the consent conditions is outlined below.

6.2 Response to Monitoring and Reporting Requirements

The Water Management Plan was prepared and distributed to EPA, DNR, SCA and Council and the documented water quality monitoring program implemented by Delta Electricity.

The routine monitoring includes monthly surface water testing and quarterly groundwater testing. The locations at which monitoring has been undertaken are shown in Figure 6.

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Figure 6

Groundwater and Surface Water Quality Monitoring Sites

Monitoring points include groundwater sampling locations using boreholes and surface monitoring at the Groundwater Collection Basin (GCB) to the east of the ash placement area and in Neubecks Creek.

Tests have included water quality and water level monitoring around the ash placement area for general characteristics (eg pH, conductivity, salts) and trace elements to characterise the water quality and hydraulic characteristics.

Monitoring of the water quality in the ash placement area, the Groundwater Collection Basin and Neubecks Creek commenced before brine co-placement operations began in 2000. Water quality reports have been prepared since 2000 in accordance with the WMP and the monitoring results have been assessed. Results are summarised in Section 6.3.

6.3 Results of Monitoring

Results for the monitoring bores, the Groundwater Collection Basin and Neubecks Creek are summarised in Tables 6.1 and 6.2 and are discussed in the following sections.

6.3.1 Monitoring at boreholes within the Ash Placement Area

The monitoring of boreholes within the ash placement provides a means of tracking the groundwater quality over time and its movement within the ash placement area. However, as the ash placement has progressed, some of these bores have been covered by ash and discontinued. The water quality in the bores adjacent to the groundwater collection basin, on the perimeter of the area and in the groundwater collection basin itself, are considered to be the most valuable from the viewpoint of long term monitoring. The locations of the monitoring sites are shown in Figure 6.

Sulphate, boron, nickel, zinc, manganese and iron are naturally elevated in the area due to the local mineralisation associated with groundwater from abandoned underground coal-mine workings. In the modelled area, this is associated with '"Goaf" areas which are coal pillars between former mine headings that have been partially mined and the roof allowed to collapse. Goaf areas are considered to have higher groundwater conductivity now than when the coal seam was intact (ie. prior to mining).

Elevated trace element concentrations are particularly evident at bores B904 and MPGM4/D10 which are adjacent areas of mine goaf (Figure 6). Elevated values in these two bores (Table 6.1) include sulphate of 892 and 813 mg/L, boron 1.5 and 1.7 mg/L and manganese of 9.2 and 3.1 mg/L respectively.

The effect of the underground mine water quality, as indicated from B904 and MPGM4/D10, is reflected in the values for the groundwater collection basin, notably in the higher sulphate and boron compared to the ash placement 'MPGM4 series' monitoring bores 4/D11 to 4/D14. Trace elements such as nickel and zinc are also elevated in these areas.

Chloride is used as the main indicator of brine leachates because of the locally elevated concentrations of sulphate and boron. The low chloride concentrations in the ground water bores, excepting MPGM 4/D11 (below the ANZECC (2000) guideline), indicates no significant effects on the local groundwater from the existing brine conditioned ash.

Table 6.1 - Average Groundwater Concentrations of Salinity, Chloride, Manganese, Sulphate and Boron in Monitoring Bores

Parameter	Goaf Affected Bores		Ash Placement Monitoring Bores (MPGM4 series) #				GCB#	Guidelines ANZECC (2000)
	B904*	4/D10 #	4/D11	4/D12	4/D13	4/D14		
Cond. (uS/cm)	-	1538	2100	1252	1244	1209	1450	
TDS	1384	1295	1423	1000	982	865	971	2000
Mn	9.2	3.1	2.8	7.0	1.46	1.35	3.05	1.9
Cl	22	35.5	226	29	68	26	25	250
SO_4	892	813	273	611	418	356	723	250
B	1.5	1.7	0.3	0.5	0.04	0.02	0.766	0.37
Fe	10.6	1.69	9.04	12.92	0.16	3.66	0.03	0.3
F	5.3	0.3	0.4	0.1	0.2	0.14	0.191	1.5
Ni	0.84	0.463	0.06	0.699	0.055	0.458	0.16	0.05
Zn	2.6	0.482	0.119	0.548	0.030	0.020	0.048	0.05

Notation: * 1997 to end of monitoring in 2000; (#) - monitoring 2001 to 2006

The effect of the increase in boron and fluoride concentrations in the brine mentioned in Section 1.2.5 has not significantly increased the ground water concentrations (Table 6.1). This is because the chloride concentrations indicate no significant leachates of brine have entered the local groundwater or the groundwater collection basin since placement began in 2000.

6.3.2 Groundwater Collection Basin

The Groundwater Collection Basin (GCB) is located to the east of the ash placement area in the Huon Creek drainage line. The water collected in the Basin is reused by Centennial Coal and does not discharge to Neubecks Creek. In future it may be used by Delta Electricity to supplement supply.

The effects of the brine conditioned ash placement on groundwater quality have been assessed to January, 2006 and changes observed in the routine water quality monitoring bores are shown in Table 6.2. The only significant increases in water quality parameters since pre-placement in 2000 were for sulphate and boron, while manganese increased and then returned to pre-placement concentrations.

Chloride, the main indicator of brine leachates, did not show a significant increase. The cause of the increase for some water quality parameters in the groundwater collection basin was thought to be due to the poor quality water in the nearby goaf areas. This effect was tested by

modelling (see Section 7). The prolonged period of dry weather may have influenced the composition of the groundwater from the underground mine.

6.3.3 Neubecks Creek

Neubecks Creek is on the northern side of the Lithgow to Mudgee Road and flows to the east. Neubecks Creek catchment to the west of the ash placement site includes a small coal mine and the Mt Piper Power Station. To the north of the Power Station is a pond that receives drainage from the power station site and which is the only monitoring/discharge point listed on the EPA Licence. It also receives drainage from the upper part of the catchment to the north west of Mt Piper Power Station.

The ash placement area has been designed such that surface drainage from areas of exposed ash is to internal pondage and this water is reused on site. To the east of the ash placement area is Huon Creek that formerly connected to Neubecks Creek. Within the course of the creek is a pond that is the former Huon Mine No. 6 Void, herein referred to either as Huon Pond or as the groundwater collection basin. Reuse of water collected in this pond avoids discharge to Neubecks Creek. In addition, discharge to Neubecks Creek from the Mt Piper site via this creek is not permitted.

Groundwater seepage at the ash placement locality is generally to the east to Huon Creek and the groundwater collection basin due to the gradient of the strata at this location. Any seepage that reaches Huon Creek is contained within the Basin and can be reused by Centennial Coal or on the Mt Piper power station site.

The effect of groundwater seepage from the void on the water quality in Neubecks Creek is expected to be insignificant for the following reasons:

- Recent surface water quality monitoring undertaken in Neubecks Creek, downstream of the groundwater collection basin has shown that sulphate, boron and manganese concentrations in Neubecks Creek averaged 108, 0.05 and 0.66 mg/L, respectively, which are less than the guidelines shown in Table 6.2.

- While boron in the groundwater collection basin exceeds the guidelines for protection of aquatic life, the guideline applies to Neubecks Creek and not the groundwater collection basin. The low concentration in the creek shows that boron in the groundwater collection basin is not having a significant effect and is essentially contained in the basin.

- Modelling of the pre-brine co-placement groundwater showed limited seepage of ground water from the groundwater collection basin to Neubecks Creek (see Pacific Power, 1999). The current modelling for the expanded area of brine placement has predicted the boron concentration in Neubecks Creek to be five orders of magnitude lower than the guideline (Table 7.1).

A comparison of water quality monitoring data in Neubecks Creek for pre-placement of brine and the current conditions (Table 6.2) shows that apart from pH, sulphate, manganese and zinc most characteristics have not changed. These increases appear to be related to the prolonged dry weather during the current period where the creek was not flowing from August, 2002 to February, 2003 and again from January, 2004 to April, 2004. The lower pH and increased manganese and zinc indicates that the flow in the creek was dominated by groundwater inflows

during the dry weather rather than catchment runoff. The local groundwater is elevated in these metals due to the acid-sulphate conditions in the local underground mine waters.

Table 6.2 - Groundwater Collection Basin and Neubecks Creek Average Water Quality Compared to Pre-brine Co-placement Groundwater Quality

Element	Groundwater Collection Basin					Neubecks Creek		
	Pre-Placement **	Dec 2000 to Oct 2002	Nov 2002 to Jan 2006	Increase Over Back-ground	Guideline Value #	Pre-placement	Nov 2002 to Jan 2006	Guideline Value #
General Water Quality (mg/L)								
pH	7.2	6.8	7.6	0.4	6.5 – 8.0	7.6	6.7	6.5 – 8.0
Conduct. (uS/cm)	1249	1530	1430	181	-	370	308	-
TDS	969	1610	1116	147	2000	217	210	1500^
Cl	20	43	22	2	350	77	13	350 +
SO_4	611	750	723	112	1000	13	108	1000 ++
Trace Elements (mg/L)								
As	0.001	0.001	<0.001*	0.0115^^	0.024	<0.001		0.024
Ag	-	-	<0.00005*	-	0.00005	-		0.00005
Ba	0.024	0.001	0.042	0.018	0.7	-	0.03	0.7 +++
Be	0.001	0.001	<0.001	-	0.1	-	<0.001	0.1
B	0.102	0.5	0.766	0.664	0.37	0.071	0.05	0.37
Cd	0.001	0.001	0.0002*	0	0.002	-		0.0015
Cr &	0.0015	0.001	<0.001*	0.001^^	0.001	-		0.001
Cu	0.009	0.001	<0.001*	-	0.005	0.002		0.0025
F	0.188	0.001	0.191	0.003	1.5	0.20	0.2	1.5+++
Fe	0.244	0.14	<0.03***	Reduction	0.3	0.053	0.05	0.3+++
Hg	<0.0001	-	<0.00005*	-	0.00006	-	<0.0001	0.00006
Mn	3.056	7.15	3.05***	0	1.9	0.071	0.66	1.9
Mo	0.001	0.001	<0.01*	-	0.01	-	0.002	0.01 +
Ni	0.422	0.518	0.16	Reduction	0.05	-	0.004	0.017
Pb	0.001	0.001	<0.001*	0.0015^^	0.005	0.001		0.005
Se	0.001	0.001	<0.002*	0.0005^^	0.005	<0.001		0.005
Zn	0.204	0.186	0.048	Reduction	0.05	0.012	0.064	0.015

Notes:

* Low detection limit testing April, 2006; Higher values in Neubecks Creek were tested at higher detection limits during routine monitoring. Creek was dry in April, 2006

** Average from data for December1993 to October 2000

*** Filtered samples for iron and manganese

^ 0.68 x 2200 uS/cm low land river conductivity protection of aquatic life ^^ difference using half detection limit

ANZECC (2000) guidelines for protection of freshwaters, livestock or irrigation water.
Cadmium, Chromium, Copper, lead, nickel and zinc adjusted for effects of hardness: Ca, Mg in GCB 147, 113 mg/L: in Neubecks Creek 19.7, 11.8 mg/L, respectively

& The values for Chromium are total Chromium while the guideline values are for Chromium VI only.

\+ Irrigation water moderately tolerant crops; irrigation. Note: Molybdenum drinking is 0.05 mg/L

++ Livestock +++ drinking water

7. Groundwater Modelling

The co-placement of brine in ash on the Mt Piper site is an effective means of disposing of the brine. It eliminates the need for transport off site and reduces the amount of freshwater used by the power station to condition the ash. Modelling of the potential water quality effects of the expanded brine placement area was undertaken to address the following issues:

- Whether the larger area of the deposit may cause an increase in seepage and an increase in concentrations of salt and trace elements in the groundwater collection basin and potentially off site.

- Because the extension area is closer to Huon Creek and the groundwater collection basin than originally planned for brine co-placement, whether the shorter distance may cause the brine leachates, although slow moving, to affect the water quality of the groundwater collection basin in the long-term.

- The groundwater collection basin is adjacent to Delta Electricity property on land owned and used by Centennial Coal. The basin provides an alternative water source for Centennial Coal's coal washery. As the basin will be left as a permanent water storage after the ash placement area is filled and revegetated, modelling included possible use of the water in the future. For the purposes of modelling, it was assumed that the current use of the groundwater would be representative of future uses but scenarios with and without pumping from CGB were assessed.

- A period of 40 years was used to represent the long term. This period was considered sufficiently long to identify the magnitude of potential impacts on the groundwater collection basin and adjacent areas.

7.1 Review of Modelling undertaken in 1999

Modelling of brine conditioned ash co-placement on groundwater quality was previously undertaken by Merrick and Tammetta (1999) and reported in the 1999 Statement of Environmental Effects (Pacific Power, 1999). Groundwater flows were shown to be from west of the ash placement area to the Eastern Drain, which enters the Groundwater Collection Basin. Modelling also showed limited connection between the basin and Neubecks Creek.

The modelling for 8 ML/year brine production and co-placement predicted an insignificant increase in salts and trace elements in the groundwater seeping into the Groundwater Collection Basin and from there to Neubecks Creek.

The predicted increases in groundwater or surface water concentrations above background are shown in Table 7.1 (Pacific Power, 1999). The increases were predicted to be below the ANZECC (2000) water quality guidelines for freshwaters or irrigation waters. All the increases in general water quality characteristics and trace element concentrations in groundwater were predicted to be very small for the existing brine co-placement. The results confirmed that the brine constituents are essentially immobilised in the pores of the water conditioned fly ash and brine conditioned fly ash. Overall the ash has a low rainfall infiltration rate, so the passage of the infiltration through the existing ash deposit is very slow. Any seepage that does reach the underlying mine spoil and the groundwater collection basin is contained and can be recovered for reuse on site.

Table 7.1 - Modelled Increase in Groundwater Concentrations of Salts and Trace Elements in the Groundwater Collection Basin and Neubecks Creek in 1999 for 8ML/year Brine Production

Element	Water Conditioned Ash at GCB	Brine Conditioned Ash at GCB	Neubecks Creek due to Water and Brine Conditioned Ash	Guidelines ANZECC/CWA #
General Water Quality (mg/L)				
pH				6.5 – 8.0
Cond (uS/cm)	90	90*	7.1×10^{-4}	
TDS	65	65	5.1×10^{-4}	2000
Cl	<0.1	11	8.5×10^{-5}	250+
SO4	36	29	2.3×10^{-4}	250 +
Na	<0.1	12	9.7×10^{-5}	300
K	3.0	1.9	1.5×10^{-5}	
Ca	10	0.78	6.0×10^{-6}	
Mg	<0.1	2.4		
Trace Elements (ug/L)				
As	1.9×10^{-4} ^	2.3×10^{-4}	7.3×10^{-9}	0.024
Ag	1.2×10^{-5}	$<9.3 \times 10^{-7}$	$<1.6 \times 10^{-10}$	0.00005
Ba	0.0041 ^	3.3×10^{-4}	8.6×10^{-8}	1.0
Be	$<1.2 \times 10^{-5}$	1.4×10^{-5}	1.8×10^{-10}	-
B	0.130	0.0147 ^	3.3×10^{-6}	0.37
Cd	0.00016 ^	1.4×10^{-5}	1.9×10^{-8}	0.0002
Cr &	1.9×10^{-4}	1.7×10^{-4}	2.4×10^{-9}	0.001
Cu	0.0028 ^	3.6×10^{-4}	1.5×10^{-7}	0.0014
F	0.051 ^	0.028	6.6×10^{-6}	1.5 +
Fe	<0.006	3.3×10^{-5} **	8.0×10^{-8}	0.3 +
Hg	$<6 \times 10^{-7}$	0.93×10^{-7}	8.0×10^{-12}	0.00006
Mn	0.0096	0.0022 **	1.3×10^{-7}	1.9
Mo	0.0027 ^	0.8×10^{-4} ^	1.8×10^{-6}	-
Ni	0.0012	0.00103 **	3.1×10^{-8}	0.011
Pb	1.9×10^{-6}	$<0.9 \times 10^{-6}$	2.4×10^{-9}	0.0034
Se	0.0022 ^	1.7×10^{-4}	1.5×10^{-7}	0.005
Zn	0.0074	1.8×10^{-4}	1.6×10^{-7}	0.008

^ application of soil adsorption
* TDS / 0.72
** included effects of desorption from mine spoil & Chromium is total chromium
# ANZECC (2000) guidelines for protection of freshwaters and Irrigation water (+)/Schedule 2 of CWA, 1970 in lieu of POEO Act Regulations which had no concentration schedule in 1999

7.2 Modelling undertaken in 2006/2007

Further modelling was undertaken in 2006/07 to predict the potential impacts of the expanded brine co-placement area on the Groundwater Collection Basin and Neubecks Creek. The final ash placement was modelled to assess future groundwater or surface water quality after the ash placement area is filled, capped and revegetated. The final placement that has been modelled contains all the currently approved brine placement area, less the 12% of unused approved area, as well as the proposed additional brine conditioned ash area, covered with 1m of normal ash and capped with vegetated spoil.

The final placement also contains all the water conditioned ash which is capped and vegetated to within 50m of the Eastern Drain.

The groundwater collection basin has shown an increase in sulphate and boron since 2000 (Table 6.2), suggesting that poor water quality in the underground mine 'goaf' areas is entering the basin. Hence, modelling of the effects of the underground mine 'goaf' areas on the water quality has also been undertaken.

The model is similar to that described in Merrick and Tammetta (1999) (see Pacific Power, 1999) and the basic assumptions and methodology for the current modelling are described in Merrick (2007), which is shown in Appendix 6. The original model has been upgraded to the latest software and re-configured to take into account the increase in area of brine conditioned ash. The model was also expanded to take into account the area to the east of the Huon Creek to provide a better understanding of how the underground mine workings interact with the Groundwater Collection Basin.

The original approved brine conditioned ash placement area was 123,000 m^2 of which 15,000 m^2 has not yet been utilised due to its use for haul truck access. The additional proposed area of 130,000 m^2 gives an effective total area of 253,000 m^2.

The amount of brine that can be contained in the ash deposit increases significantly from the approved 184 ML. Already 125 ML has been co-placed, to the end of 2006, by conditioning of ash and its placement in the approved area. The original proposal was for 17% brine conditioned ash but in practice 15% has occurred due to plant constraints. However, as brine conditioning of the ash in the future is expected to be at the planned rate of 17%, modelling was been undertaken on this basis.

The current modelling took into account changes in brine composition since 1999, which has shown an increase in salinity of about 17% (see Section 1.2.6). For the purpose of the modelling, the increase in trace metal leachates from the brine conditioned ash was assumed to be proportional to the increase in salinity.

7.3 Effects of Proposed Increased Brine Co-placement

The updated model was run with and without the effects of groundwater extraction induced by pumping from the Groundwater Collection Basin. Modelling was undertaken over a 40 year time-frame and worst case conditions of constant long-term 50th percentile rainfall (rate of 875 mm/year) to indicate long-term equilibrium conditions after final ash placement. The resulting water level contours with pumping are shown in Figure 7.

Results of the modelling are given in Appendix 6 and the predicted increase in salts and trace elements in the groundwater collection basin and Neubecks Creek were made for both the brine conditioned ash placement and the much larger water conditioned ash volume. This was done to show the predicted increase due to the brine conditioned ash above that of the water conditioned ash.

To investigate the causes of the elevated sulphate and boron in the Groundwater Collection Basin in recent years, modelling of the effects of underground mine goaf areas was undertaken. The modelling results shown in Table 7.2 are for the effects of the brine conditioned ash with the goaf either blocked or connected to the Groundwater Collection Basin. Limited pumping of water from the void for local water use was also modelled to assess its effects on the water quality in the GCB.

Table 7.2 Proposed Expanded Brine Placement Area Modelled Increase in Groundwater Concentrations in the Groundwater Collection Basin and Neubecks Creek with and without Goaf Connection to the GCB

Element	Impact of Brine Conditioned Ash at Groundwater Collection Basin (GCB)			Impact at Neubecks Creek due to Brine Conditioned Ash		Guidelines ANZECC#	
	Impact of Brine Area Only		Impact of Water Conditioned Ash Only				
	Goaf***	No Goaf	No Goaf	Goaf***	No Goaf	GCB	Creek
General Water Quality (mg/L)							
pH						6.5 – 8.0	6.5 – 8.0
Cond (uS/cm)	35*	45*	20*			-	-
TDS	27	35	15.5	30.1	1.60E-02	2000	1500^^
Cl	5	0.06	0.02	3	0	350	350 +
SO4	12	20	9	17	0	1000	1000 ++
Na	5	0.06	0.02	3	0		
K	0.8	1.6	0.7	1	0.0		
Ca	0.3	6	2	3	0.0		
Mg	1.0	0.06	0.02	2	0.0		
Trace Elements (mg/L)							
As ^		1.7E-04	7.3E-05		9.5E-08	0.024	0.024
Ag		2.8E-05	1.2E-05		9.5E-10	5.0E-5	0.00005
Ba ^		3.6E-03	1.6E-03		1.4E-07	0.7	0.7 +++
Be		1.1E-05	4.9E-06		5.7E-09	0.1	0.1
B^	0.4	1.2E-01	5.2E-02		1.2E-05	0.37	0.37
Cd ^		1.6E-04	7.1E-05		5.7E-09	0.002	0.0005
Cr &		3.3E-05	1.5E-05		7.0E-08	0.001	0.001
Cu ^		2.5E-03	1.1E-03		1.5E-07	0.005	0.0025
F ^		3.2E-02	1.4E-02		1.1E-05	1.5	1.5+++
Fe		5.7E-03	2.5E-03		1.3E-08	0.3	0.3+++
Hg		2.8E-06	1.2E-06		9.5E-11	6.0E-5	0.00006
Mn		9.1E-03	4.0E-03		8.4E-07	1.9	1.9
Mo ^		2.5E-03	1.1E-03		1.6E-06	0.01	0.01 +
Ni	0.055	1.2E-03	5.4E-04		3.8E-07	0.05	0.017
Pb		1.7E-04	7.4E-05		3.8E-10	0.005	0.005
Se ^		2.0E-03	8.9E-04		3.4E-07	0.005	0.005
Zn	0.140	6.7E-03	3.0E-03		7.4E-08	0.05	0.015

^ application of soil adsorption; negative results set to zero
* TDS / 0.77 for groundwater and TDS/0.68 in Neubecks Creek
** included effects of desorption from mine spoil
*** Only exceedences of the ANZECC guidelines shown for effects of goaf water quality
^^ 0.68 x 2200 uS/cm low land river conductivity protection of aquatic life
# ANZECC (2000) guidelines for protection of freshwaters, livestock or irrigation water.
Cadmium, Chromium, Copper, lead, nickel and zinc adjusted for effects of hardness: Ca, Mg in GCB 147, 113 mg/L: in Neubecks Creek 19.7, 11.8 mg/L, respectively
& Values for Chromium are for total Chromium. Guideline values are for CrVI only.
+ irrigation water moderately tolerant crops; irrigation. Note: Molybdenum drinking is 0.05 mg/L
++ Livestock
+++ drinking water

The modelling results, when compared to the effects of the water conditioned ash and the relevant ANZECC (2000) guidelines, show that the extended area for placement of brine conditioned ash is not expected to cause a significant increase in the concentrations of water quality parameters in the local groundwater or in Neubecks Creek.

The minimal effects of leachates from the ash deposits were due to the slow rate at which leachates from the brine conditioned ash enter the groundwater and mixing of this with the background groundwater in the rubble drain, formed by the mine spoil, under the ash deposit. The groundwater then flows primarily to the Groundwater Collection Basin. A lesser amount may reach Neubecks Creek but the modelling has shown that predicted values do not exceed the criteria.

The predicted increases in water quality parameters due to inputs from the underground mine goaf areas were below the ANZECC guidelines, except for boron, nickel and zinc which are naturally elevated in the 'goaf' areas (Table 7.2). Most of the predicted increases were assessed as being due to poor water quality in the underground mine workings moving toward the groundwater collection basin, and are unrelated to the brine placement area or water conditioned ash placement. Pumping of water from the groundwater collection basin was indicated to make little difference to the results.

The predicted long-term increases for sulphate of 183 mg/L and boron of 0.52 mg/L (Table 7.2) were similar to the observed short-term increases of 112 mg/L and 0.664 mg/L, respectively since 2000. This suggested the recent increases are due to the current prolonged drought and increases in concentrations in the groundwater collection basin would be expected to fluctuate over time depending upon local conditions.

The lack of effects of the existing and expanded brine placement on the local groundwater is demonstrated by the chloride distribution shown in Figure 9. The predicted distribution after 40 years was centred on a local area of low sulphate and high chloride at groundwater bore MPGM4/D11 which did not significantly affect the chloride in the GCB and was not associated with the brine conditioned or water conditioned ash.

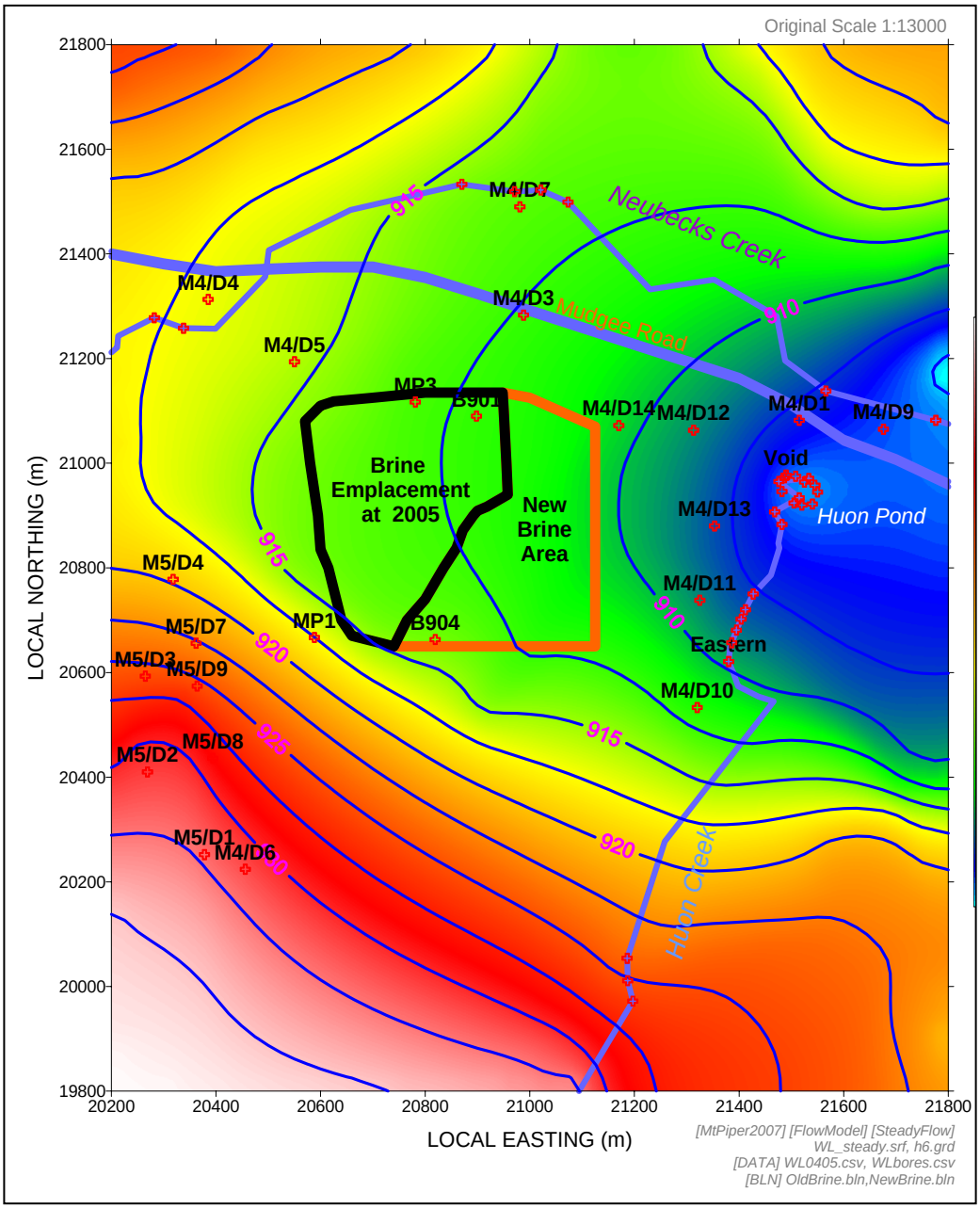

Figure 7 - Simulated groundwater level contours when the ash mound is finished (mAHD). Minimum groundwater collection basin water level 904.0 mAHD.

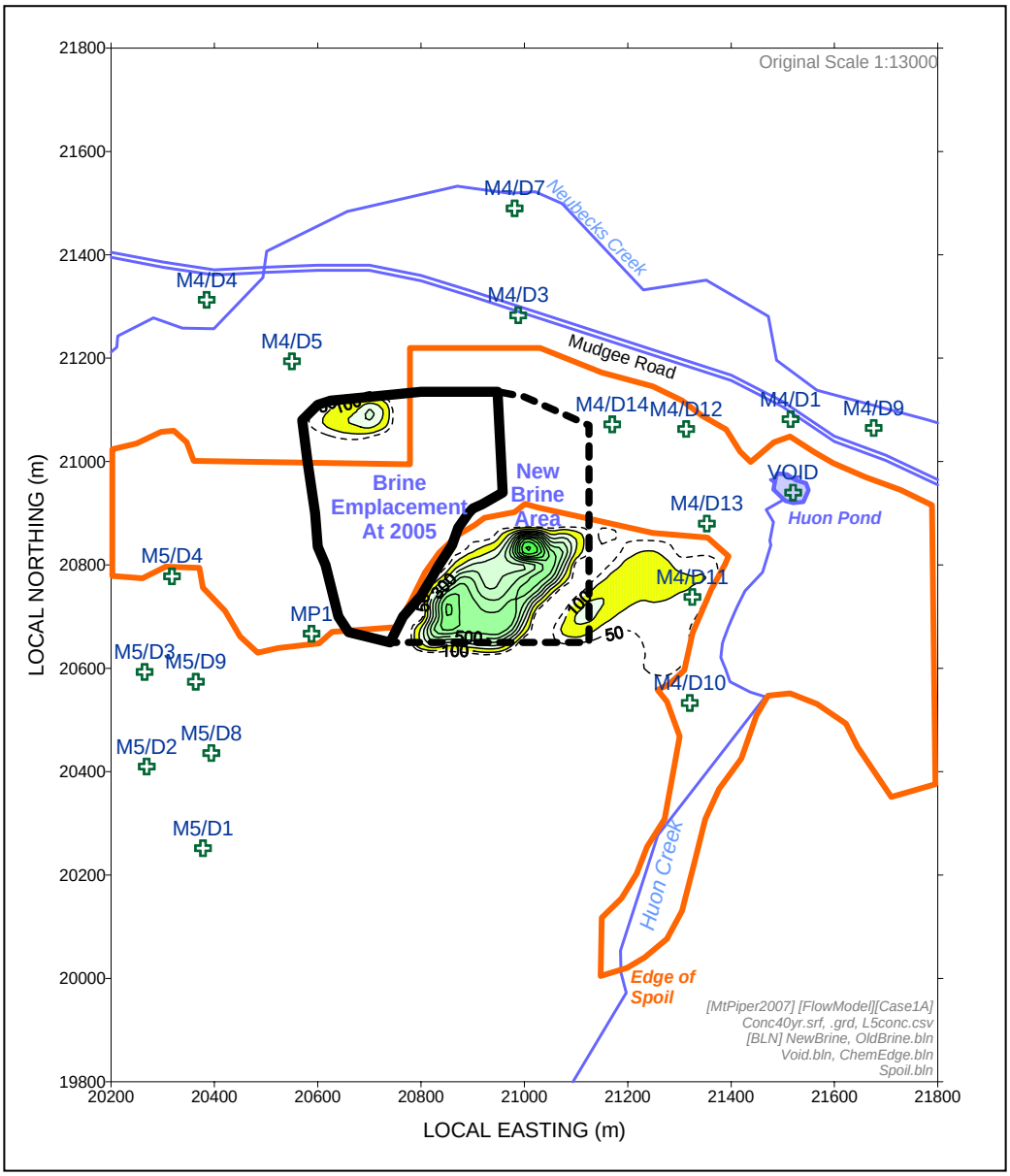

Figure 8 - Simulated Concentrations (increase above background) of Salinity (mg/L) in Groundwater after 40 Years with Pumping From the Groundwater Collection Basin. Sustained Source Assumed in Brine-Ash and Water-Conditioned Ash

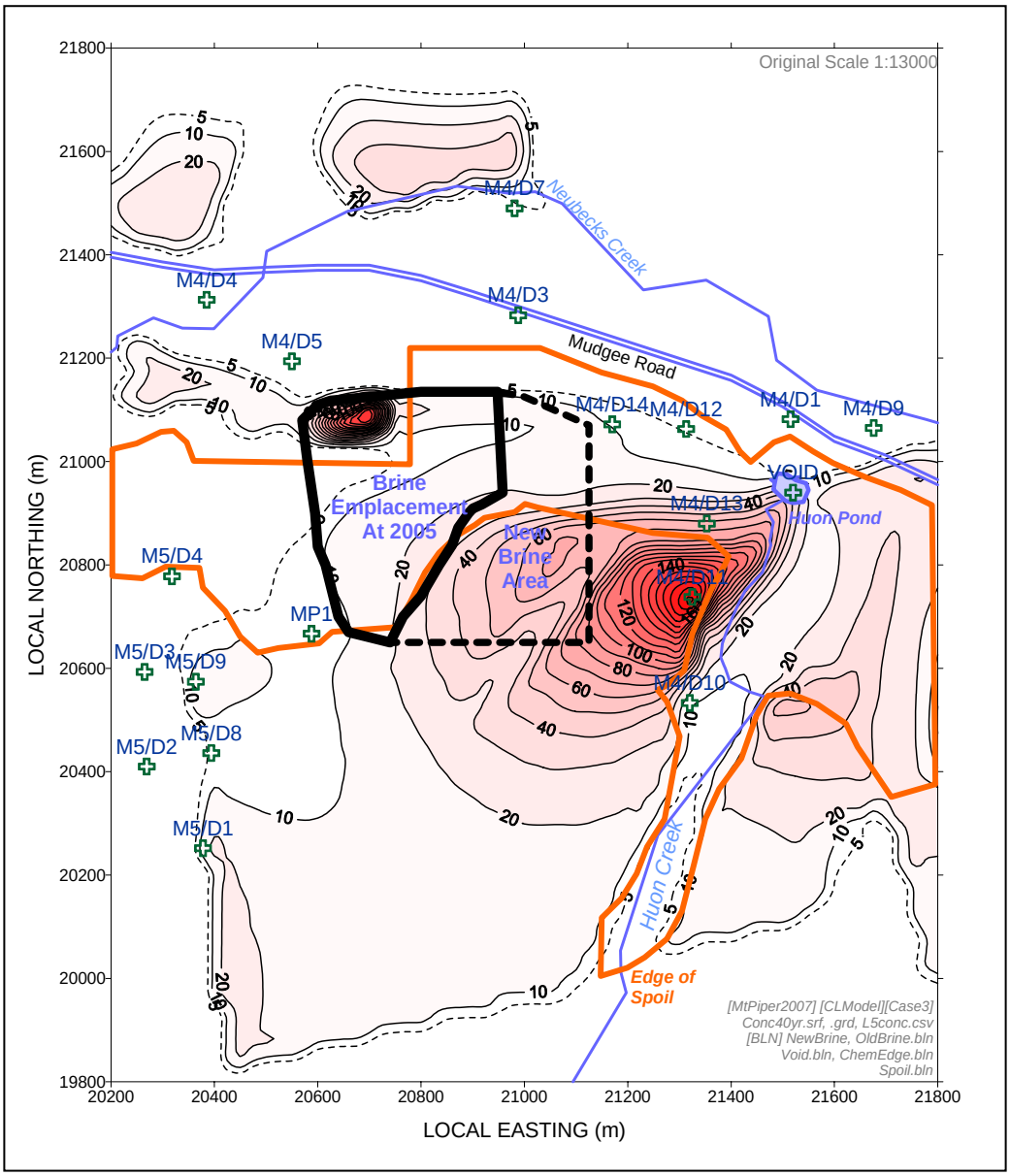

Figure 9 - Simulated Concentrations (increase above background) of Chloride (mg/L) in Groundwater after 40 Years Assuming Initial Sustained Source in Goaf with Goaf Hydraulic Conductivity 5 ML/Day. Groundwater Collection Basin when Pumped

8. Summary of Mitigation Measures and Safeguards

The proposed extension will be undertaken in accordance with the existing management controls, which are set out in the Mt Piper Power Station Brine Conditioned Fly ash Co-placement Water Management and Monitoring Plan. The plan includes placing the brine conditioned ash some 37 metres above the maximum predicted groundwater table so that interaction of the brine with groundwater is minimised. Should monitoring indicate significant and persistent brine leachates appearing in the Groundwater Collection Basin or Neubecks Creek, the placement of brine conditioned fly ash will be temporarily suspended pending outcome of investigations into the causes. The lined brine storage ponds have the capacity to store 40ML of brine, so with the expected maximum annual brine production of 16 ML, there is ample time to undertake an investigation and correct the cause. Brine conditioned ash placement would re-commence with approval by the relevant authorities.

Details of the brine conditioned ash co-placement mitigation measures are summarised below:

- Controls have been implemented to prevent or intercept spillage of brine between the lined brine storage ponds and the conditioning plant
- Conditioning of ash will be maintained at about 15% moisture to prevent dusting;
- Measures to contain any water or brine conditioned ash that may spill as a result of failure of the closed conveyor. These involve the Power Station's services that are able to contain and collect any spillages
- Brine conditioned ash will only be placed in the approved area in cells with suitable drainage to collect any run off into lined detention ponds
- The proposed increase in the area of brine conditioned ash placement will be subject to controls including the perimeter drain, detention pond and sprinkler system to prevent dusting
- Runoff detention pond storage will be increased and maintained to contain run-off from the extended area of brine conditioned ash. The capacity will be adjusted relative to the catchment area for the brine conditioned ash placement.
- Any run-off from the brine conditioned ash placement area, collected in the detention ponds, will only be reused in the brine conditioned ash placement area
- Run-off from the brine conditioned ash will not be used for spray irrigation or dust control outside the perimeter drains for the area from which it is collected. A separate storage is available for that purpose
- Freshwater sprays will be used at the ash placement site to control dust from the water conditioned ash surface and to assist revegetation of capped areas. Vegetation will be deliberately selected to minimise ongoing maintenance and requirement for watering
- Groundwater and surface water quality monitoring will be maintained and reports of results will be regularly reviewed to assess whether any surface or groundwaters have been affected by release of salts and or associated trace elements. The monitoring will include bores inside and outside the ash placement area and in the receiving waters of Neubecks Creek and the Groundwater Collection Basin
- Piezometers have been installed to monitor infiltration of surface run-off into the ash to confirm the effectiveness of the water management system
- A site maintenance plan will be implemented for the period after closure of the ash placement area
- Delta Electricity proposes to acquire the land on which the Groundwater Collection Basin is located and will pursue negotiations with Centennial Coal for that purpose

- Delta Electricity has reviewed changes to the sequence of its ash placement arrangements to provide visual screening of the active ash placement area when implemented.

In due course, Delta Electricity will develop arrangements for disposal of brine after the approved area has been filled and the ash placement area is completed. Such arrangements will be the subject of a separate approval process

9. Conclusion

Mt Piper Power Station's existing water management plan avoids off site discharge of saline water blowdown from the station's cooling water system. The blowdown is processed on site and up to 1,400ML/year of reclaimed water is reused. A suitable disposal option is required for up to 16ML/year of brine that is produced as a waste product of the treatment process. The co-placement of brine and ash provides a practical, economic and environmentally acceptable means of disposing of the brine and has been used since 2000. Use of brine to condition a proportion of the fly ash disposed on site reduces the station's water supply required for ash conditioning.

The existing area approved for brine conditioned ash placement has proven to be inadequate for the remaining period of ash placement at this site. This situation has arisen primarily due the increased brine production rate, which in turn is due to, the extended drought conditions being experienced in the area and, to a lesser extent the increased generation levels. With the potential for continuation of the dry conditions and a further increase in generation, there is a need to seek an extension of the approved brine conditioned ash placement area sufficient to allow continued use of the site until the ash placement has reached its approved final height.

The extension being sought will increase the proportion of the ash placement area being used for brine in ash co-placement from 123,000m^2 to 253,000 m^2. The extension is still within the approved ash placement area and above a significant thickness of water conditioned fly ash. The volume of brine conditioned ash that can be placed within the extended area will increase significantly and the full capacity of the area being sought is unlikely to be needed solely for brine conditioned ash placement. The final approved form is not varied by the extension.

Water quality management is regarded as the most significant issue for assessment in relation to the proposed extension and has been discussed in Sections 6, 7 and 8 and the outcome is summarised below.

Previous studies have indicated that the brine is held in the pore space within the placed ash and that only a small part of it is released. Monitoring of surface and groundwater has shown that the ash placement arrangement does provide effective containment for the brine.

Modelling has considered impacts after 40 years and has shown that the proposed extension of the approved brine conditioned ash placement area can be undertaken without significant impact on surface or groundwater quality for the locality. In addition, the groundwater collection basin immediately to the east of the ash placement area is well located to receive any groundwater that could potentially seep from the ash placement area and enables it to be captured and reused. The site water management plan will include this control measure.

Environmental issues other than water quality issues have been reviewed (section 5) and assessed as not being significantly impacted by the extension of the area for brine and ash co-placement. These aspects can be adequately managed within the existing operations.

Based on the findings presented in this Statement of Environmental Effects, it is considered that the proposed extension can proceed without significant impact on the environment or the surrounding community.

10. References

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