Mt Piper Power Station Extension

ENVIRONMENTAL ASSESSMENT

CHAPTER 5 – WATER CYCLE MANAGEMENT

- September 2009

Contents

5. Water Cycle Management

The Director-General's requirements

- *Include an integrated water balance for the operation of the project considering water sharing requirements with the existing Mount Piper and Wallerawang Power Stations, identifying indicative water use, wastewater generation and disposal requirements;*
- *Demonstrate the availability of viable water sources to sustainably meet the water requirements of the project for the life of the project. Consideration shall be given to water reuse and recycling options (including use of treated effluent, rainwater, on-site treatment and use of mine water), the security of supply, current and future water demand in the region and potential impacts on other users; and*
- *Reflect a design philosophy of zero water discharge from the site, except for natural surface water flows and provide an assessment of the likely risks to water quality associated with the project including to drinking water catchments consistent with the heads of consideration provided in Drinking Water Catchments Regional Environmental Plan No. 1, considering key ancillary components (such as ash disposal).*

5.1 Existing Environment

5.1.1 Receiving Water Catchments

The existing Mt Piper Power Station is located in the upper catchment of the western arm of Neubecks Creek. The site is adjoined on three sides by steep hillslopes which are drained by small, ephemeral creek lines to Neubecks Creek which, in turn, flows east and south to join the Coxs River, three kilometres south of Blackmans Flat. The Coxs River flows south through Lake Wallace and Lake Lyell, and ultimately joins the Hawkesbury River.

South of the Mt Piper site is the eastward flowing Pipers Flat Creek which joins Coxs River north of Wallerawang Power Station. Thompsons Creek is a north flowing tributary of Pipers Flat Creek.

There is one licensed discharge from Mt Piper Power Station to the receiving waters. The existing EPL for Mt Piper (EPL 13007) lists a discharge and ambient monitoring site (EPA ID No 1). At this point clean, uncontaminated water, principally stormwater, drains from the site to Neubecks Creek via a holding pond which has an underflow weir. There are no concentration limits set for water discharged from the site, but Delta is required to comply with the requirements of Section 120 of the POEO Act. Monitoring requirements are for pH, total suspended solids and conductivity.

Neubecks Creek is on the northern side of the Castlereagh Highway and flows to the east. Its catchment upstream of the discharge point is limited to a small area north west of the existing power station. Connell Wagner (2007) undertook a study relating to brine placement in the existing ash storage area and in that study provided a summary of recent water quality data from Neubecks Creek at a point downstream of the existing point discharge from the power station. The results showed that pH, conductivity and TDS all fall within relevant ANZECC (2000) guidelines. During periods of prolonged dry weather the creek does not flow and such flow as does occur is generally dominated by groundwater inflows.

5.1.2 Groundwater

Coal measures rocks in the Sydney Basin are generally considered poor groundwater prospects because of low bore yields and water quality that is only fair to poor, ie. suitable for stock use but often non-potable. The seams themselves act as semi-confined aquifers of low hydraulic conductivity and moderate to high salinity when undisturbed. The underlying Shoalhaven Group rocks, which are present at depth but do not outcrop in the vicinity of the power station, contain small but significant amounts of fine sulphide minerals.

Once mined, however, and especially following long wall mining or pillar extraction and subsequent ground subsidence, the coal measures rock mass above and close to the workings may increase in permeability and storage capacity by three orders of magnitudes or more. Discharging mine water from collapsed shallow workings, such as those in the Mount Piper area, tends to be low in salinity because of its accessibility to infiltrating rainwater, but acid in places. The most obvious indication of mine water discharge is typically rust-like iron oxide efflorescence at springs and along drainage lines trending downslope from old workings or seam crop lines.

Logs of groundwater monitoring bores in and around the power station are described in Pacific Power International (2001). The three observation wells closest to the proposed extension area indicate the groundwater is of low salinity (<300mg/L TDS) but is slightly acidic (pH5-6). Standing water level is in the range of RL 908-916, which is equivalent to depths of 3-8m below ground level. Annual water level fluctuations within these boreholes are generally less than 1m.

A search of the Department of Natural Resources groundwater database revealed three registered water bores within approximately 3km of the Mt Piper site (refer to **Table 5-1**). It should be noted that even though the water quality is not given, it can be deduced from the stated use of the well. Domestic and irrigation water would normally be less than 1000mg/L total dissolved salts (TDS) and preferably <500mg/L. Stock water might be a little more saline, say up to 2000-3000mg/L. It is also noteworthy that all three boreholes are in bedrock rather than alluvial sands, indicating that such deposits are sparse in this area.

Table 5-1: Registered Bores

DNR Borehole No	Depth	Water depth	Yield	Comments
GW101461	45.0m	15.0m	0.33L/s	Stock and domestic, in blue shale. Quality not known.
GW53071	15.2m	No record	4.5L/s	Stock, domestic, irrigation. Quality not known.
GW50996	45.7m	No record	0.38L/s	Domestic, in sandstone. Quality 'good'.

Groundwater quality beneath the proposed new plant is also influenced by mine water moving down gradient from nearby abandoned workings. Observations of rust-staining in drains near the present gate house suggest that this water is acid and iron-charged, although it is noteworthy that groundwater in the floor of a concrete-lined canal beside the main power station entry road is clear. This suggests that groundwater passing beneath the power station is derived from more than one source.

Groundwater quality in the vicinity of the nearby fly ash emplacements has been monitored for some years by means of a number of observation wells. The water quality results indicate that the water is of fair to good quality. Sulphate, boron, nickel, manganese and iron are all naturally elevated in the area due to the local mineralisation associated with groundwater from abandoned underground coal-mine workings (Connell Wagner 2007).

5.1.3 Existing Water Requirements and Supply

Water supply to the Wallerawang and Mt Piper Power Stations is from two separate catchment areas, coastal (Coxs River) and central west (Fish River). The Coxs River system is a tributary of the Nepean River, while the Fish River is part of a central western catchment system and is a north westward flowing tributary of the Macquarie River.

Mt Piper and Wallerawang Power Stations obtain their water supplies from the Fish River and Coxs River Water Supply Schemes. Delta is entitled to extract up to 23,000 ML/yr from the Coxs River Scheme under the terms of its Water Management Licence (WML 00002) issued by State Water under Part 9 of the *Water Act, 1912*. The licence was issued in July 2000 and is reviewed once in every 5 years. The term of the licence may be up to 20 years and the 20 year term may be extended for 5 years at 5 year intervals, maintaining the 20 year lead time. The licence currently holds until 1 July 2025. The next review is due by 1 July 2010.

The Fish River allocation is a maximum of 8,184 ML/year under the Fish River Water Supply Agreement (Agreement Concerning the Supply of Water from the Fish River Water Supply

Scheme – State Water Corporation, 2008) but this allocation is reduced during drought conditions, in accordance with the Fish River Water Supply Operating Rules. As at August 2009 Delta's allocation is reduced to 40% (3,274 ML) of the total maximum available under the agreement.

In June 2009 the State Water Corporation re-commissioned the Duckmaloi River Diversion. The Duckmaloi River is a tributary of the Fish River and is a supplement to the Fish River supply received by Delta Electricity. The quantity of water supplied from the diversion is related to the available river flow at the Duckmaloi Weir. As an indication the volume of water transferred in July 2009 was 134 ML.

An agreement between Delta Electricity and Springvale Coal in 2006 makes provision for mine water to be transferred from the Springvale/Angus Place underground mine complex to Wallerawang pipeline via a water transfer scheme. This system has a design capacity of 30ML per day and has averaged a transfer rate of about 15 ML per day since commissioning, subject to its availability and mining operations. In 2007/2008 the scheme supplied 4,485 ML. The scheme reduces the uptake of water from the Coxs River by Wallerawang Power Station therefore increasing the amount of water available for uptake by Mt Piper Power Station by approximately 15ML a day.

The supply processes are interlinked, as follows:

- The Coxs River drains east and south to the Hawkesbury Nepean system. There are two storages along the river – Lake Wallace which has an active capacity of 3,230 ML and, further downstream, Lake Lyell which has an active capacity of about 31,450 ML;
- Mt Piper is supplied from Lake Lyell directly and when sufficient flow is available via a pumping system to a storage on Thompsons Creek. The Thompsons Creek Dam has an active capacity of up to 27,500 ML, and supplies Mt Piper Power Station by gravity feed;
- Wallerawang Power Station is supplied directly from Lake Wallace which is augmented by refilling from Lake Lyell when required;
- The Fish River supplies both Wallerawang and Mt Piper Power Stations, with most flow going to Wallerawang. The pipeline off-take to Mt Piper Power Station is near Portland.

Water supply to the existing Mt Piper Power Station from the Fish River is less than 1 ML/day for domestic usage on the site. An allowance of up to 22 ML/day can be used as cooling tower make-up water, but at present no Fish River water is used for this purpose.

Water supply from the Coxs River scheme is used for cooling tower make-up (about 1,300 ML/month) and for the wash down water system (about 15 ML/month).

The water cycle relating to Delta's operations is shown in **Figure 5-1**.

The total water extracted from these systems for the combined power station systems is 1.64 ML/GWh (ie approximately 24,600 ML for 15,000 GWh generation).

5.1.4 Existing Water Treatment and Discharge

The existing Mt Piper Power Station is configured for zero discharge of process water to the surface receiving waters. The existing cooling water blowdown and regeneration water treatment plant is designed to prevent discharge of station process and drainage wastes in accordance with the terms of the EPL. The system is capable of treating 6.9 ML/day of wastewater in two Brine Concentration units. Temporary storage for brine concentrate is available in two 20ML holding ponds. Brine concentrate extracted from these ponds is used to condition some of the flyash and is immobilised in the ash storage area.

Contaminated water may be polluted by oil or oil products such as degreasers or detergents. The main components of the drainage system are:

- Gravity collection system;
- Contaminated water pumping stations and associated rising mains;
- Settling pond; and
- Oil-water separator tanks.

Oil contaminated plant drainage, washdown and fouled rainwater runoff is directed via gravity pipelines to two contaminated water pumping stations. The contaminated water is pumped to the settling pond and gravitates, via a flow regulating float valve and weir, to the oil-water separator tanks.

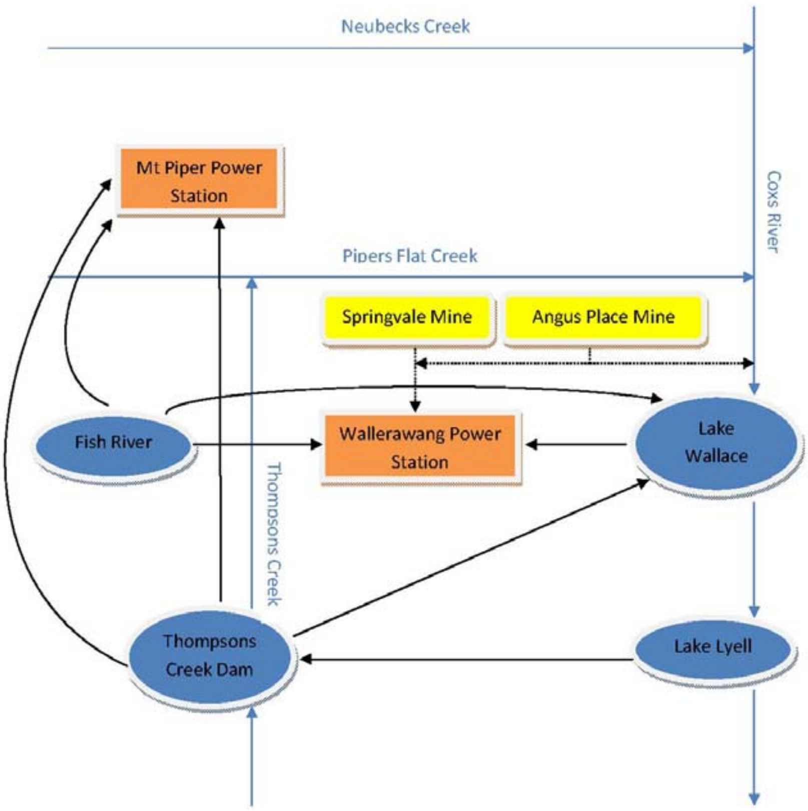
A series of ponds form an integral part of the design of the water treatment scheme for the existing power station, and provide one or more of the following functions:

- Buffering for chemical stabilisation;
- Buffering of flow variations;
- Storage capacity for maintenance; and
- Storage for later disposal.

All three settling ponds are available for receipt of ash washdown water and water treatment and water recovery plant effluent. Settled water from these ponds gravitates to cooling water Blowdown Pond B. The brine concentrators are designed to prevent discharge of station process and drainage wastes which do not comply with discharge requirements. They are located in the eastern end of the water treatment plant building.

In July 2009 a 6ML/day Reverse Osmosis (RO) plant was commissioned to treat cooling water blowdown during periods where the input water from the Coxs River system contains elevated levels of salinity (during drought). The RO plant provides pre-treatment for the Brine Concentrators to ensure they remain within their design limits for throughput capacity.

.



▪ **Figure 5-1 Water Supply Schematic**

The two train brine concentrator system is capable of treating of 6.9 ML/day of waste water, to produce 6.8 ML/day of high quality product water (distillate) for re-use. Both trains are fed from the cooling tower (and RO rejects) Blowdown Pond A, which in turn is linked by pipeline to the

Blowdown Pond B. The brine concentrate waste (approximately 70 kL/day of concentrated solids) is directed to waste storage ponds A and B. The distillate is transferred to the clean water pond.

Brine concentrate is piped to the two brine concentrate waste ponds then disposed of with ash at the western end of the ash disposal area.

5.2 Proposed Water Management during Operation

5.2.1 Water Requirements for the Extension

Water requirements for the Mt Piper Power Station Extension were calculated for both the coal and gas options. The water balance considers two main areas – the shared water treatment facilities and water for the proposed extension.

Coal Option

Aurecon (2009) calculated an annualised raw water usage for the coal fired extension option based on a 90% capacity factor. It was assumed that the capacity of the existing pondages, demineralised water plant and brine concentrator would be sufficient to supply demineralised water and to recycle produced waste water from the extension. The annual net raw water usage was estimated at 1,016 ML. The water supplies and losses to and from the extension control volume are summarised in **Table 5-2**.

- **Table 5-2 Annual Water Demand Estimate - Coal**

Water Usage	Units	Quantity
Supplied water to the extension		
Total raw water supply into the extension	[ML/y]	1016
Total demineralised water into the extension from the shared water treatment system	[ML/y]	469
Rainfall	[ML/y]	117
Water losses from the extension		
Evaporation losses from different systems in the extension	[ML/y]	855
Water mixed with disposed ash	[ML/y]	239
Pre-treated water to the shared demineralised water plant	[ML/y]	215
Extension waste water to shared settling ponds for recycling	[ML/y]	180
Extension waste water to shared clean water ponds for recycling	[ML/y]	113

Gas Option

SKM (2009) estimated raw water usage for the proposed gas plant. It was assumed that water would be required for domestic purposes, fire fighting, maintenance, washdowns, compressor washing etc, make-up to the water steam cycle, evaporative coolers, if fitted to the gas turbines, to increase output on hot days, fogging systems (or equivalent), if fitted to the gas turbines to increase gas turbine output on the hottest days and spray assist to the air cooled condenser to try to maintain a low steam turbine back pressure during the hottest days.

As make up for the water steam cycle would be fairly constant, regardless of ambient conditions, operational demand would be determined by the last three optional enhancements.

Table 5-3 summarises potential water demand for a range of design scenarios, with the ambient conditions of 35°C and 20% RH.

- **Table 5-3 Water Demands, Depending on Design**

Design	Units	No cooling	Evap Cooling on GT	High Fogging on GT	Spray Assist on ACC
Net Power	[MW]	1,881	2,086	2,188	2,290
Net Heat Rate, HHV	[kJ/kWh]	7,340	7,300	7,290	6,970
Evap cooler demand	[kg/s]	-	20	20	20
Raw water demand for evap cooler	[kg/s]	-	40	40	40
Demineralised water demand					
Steam Cycle Makeup	[kg/s]	5.8	6.2	6.3	6.3
Fogging	[kg/s]	-	-	20.3	20.3
ACC Cooling	[kg/s]	-	-	-	811
Total demineralised water demand	[kg/s]	5.8	6.2	26.6	837.7
Raw water requirement for demineralised water plant	[kg/s]	6.4	6.8	29.3	921.5
Total raw water demand	[kg/s]	6.4	46	68.9	961
Total raw water demand	[t/h]	23	166	248	3,460
Additional water demand	[t/h]		143	225	3,437
Additional MW over base	[MW]	-	205	307	409
Additional water use rate	[t/MWh]		0.70	0.73	8.41

Annual water demand has been estimated (see **Table 5-4**) based on historical temperature and relative humidity data for Mt Piper and the following assumed operating regime: a Capacity Factor of 95% (conservative operation), evaporative cooler in service at temperatures above 15°C –

approximately 2900 hours per annum, 150 hours of fogging per annum and 20 hours of ACC cooling assistance per annum.

Table 5-4 Annual Water Demand Estimate – Gas option

Water Usage	Units	Quantity
Demineralised water		
Steam Cycle Makeup	[ML/y]	200
Fogging	[ML/y]	11
ACC Cooling	[ML/y]	60
Total Demineralised Water	[ML/y]	271
Raw water		
Demineralised plant feed	[ML/y]	300
Evaporative cooling	[ML/y]	160
Total Raw Water	[ML/y]	460

Domestic use would be similar to that estimated for the coal fired option.

5.2.2 Proposed Water Treatment during Operation

During the operation of the site, the main water quality pollutants of concern would be those associated with the operation of the plant. Oil contaminated plant drainage, washdown and fouled rainwater runoff is directed via gravity pipelines to two contaminated water pumping stations. The contaminated water is pumped to the holding pond and gravitates, via a flow regulating float valve and weir, to the oil-water separator tanks. If the existing operation were unable to accommodate the extra flow from the proposed extension, an independent collection and separation system would be provided.

Coal Option

The water discharges from the coal option would be directed ultimately to the brine concentrators. Brine concentrator product water would be used as feed to the demineraliser plant and brine concentrate directed to waste brine ponds. Brine concentrate would most likely be disposed of with ash, as currently occurs. The new units would not affect the zero discharge status of the power station and the installed and expanded water recovery system would be able to handle the small additional load.

Gas option

Effluent water would come from: waste from the demineralised water treatment plant, blowdown from the water/steam cycle, chemically contaminated wastes, blowdown for the evaporative cooler, GT compressor water wash waste, oily wastes and clean stormwater.

The first 3 of these effluents can be routinely handled with on-site treatment and neutralisation and any resultant effluent will be reused on site, disposed of to the existing coal fired plant or collected and disposed of by a licensed contractor. Alternatively, these waste streams could be piped directly to the existing plant for treatment. The expected volume is in the order of 25t/h, and could probably be used to offset raw water demand at the existing plant.

If installed, blowdown from the evaporative cooler (estimated to be approximately 20t/h at 35°C and 20% relative humidity) would not need on-site treatment and could be used to offset cooling water demands at the existing coal fired power station. Based on the operating regime 80ML of blow down may be available from this source per annum.

Water wash wastes would be collected separately and disposed of by a licensed contractor. As for the coal fired option, all bathroom and sewage effluent would be sent to the existing sewage treatment plant.

Oily wastes would be collected and the oil removed in a Class 1 (in accordance with EN 858) (5ppm) separator with the resultant effluent either reused or disposed of to the existing plant.

Clean storm water would be reused where possible, and where not, disposed of to the existing or extended plant storm water system and discharged via the licensed discharge point to Neubecks Creek.

5.2.3 Overall Water Balance

The long-term average water use at the existing Mt Piper power station is 1.53Ml/GWh sent out. The maximum average annual energy sent out for Mt Piper, averaged over 5 years to account for major outages, is 9250GWh and the annual average water use is therefore 14,150ML.

The long term average water use for the existing Wallerawang Power Station is 1.69Ml/GWh sent out. The maximum average annual energy sent out for Wallerawang, averaged over 5 years to account for major outages, is 5180GWh and the annual average water use is therefore 8,750ML.

Total annual average water requirements for the both stations is therefore 22,900ML. That volume of water is provided through existing licensing to extract water from waterways and agreements to use mine water from available sources within the area. Water available under licences and agreements comprises:

- Coxs River scheme 23,000 ML/yr;
- Fish River – 8,184 ML/yr (currently reduced to 3,274 ML/yr) and Duckmaloi River diversion;
- Mine water – recently using 4,485 ML/yr.

The volume of raw water required for the proposed extension would comprise:

- Coal option – 1016 ML/yr;
- Gas option - 460 ML/yr.

Clearly the volume of water required for the proposed extension fits well within the existing availability of water from the various sources. No changes to the existing Water Management Licence or other agreements would be required to provide water for the proposed extension. For the existing Mt Piper power station and the proposed extension a significant reuse program is and will be in place, thereby minimising the requirement for raw water and ensuring maintenance of the "zero discharge" policy.

5.2.4 Long-term Availability of Water

A review of rainfall records since 1900 has indicated that under a 95 percentile drought lasting for 5 years and allowing for environmental flows, evaporation, inflow from sewage treatment plants and miscellaneous mine drainage, net inflows from the Coxs River to the storage systems would total approximately 4000ML/year. In addition the Springvale mine delivers a reliable 5,500ML/year.

As noted above the Fish River supply is about 8,140 ML/year, reduced under drought conditions in steps to a minimum 4% allocation when Oberon Dam is below 5% capacity. However, due to physical limitations in plant design, Wallerawang requires a minimum Fish River allocation of 2,620ML, which occurs when Oberon dam reaches 10%. Wallerawang cannot operate without at least this allocation of Fish River water, regardless of how much Coxs River water is available. If this Fish River water is not available, then the Wallerawang Coxs River allocation would not be used.

Therefore, the net Coxs River deficit under a 95percentile drought is (22,900 - 4000 - 5,500 - 2620) = 10,780ML/yr. The storage systems on Coxs River (Lake Wallace, Thompsons Creek Dam and Lake Lyell) have a combined storage capacity of 61,180ML. Under a 95 percentile drought, the storages would last (61,180/10,780) years = 5.7years. Assuming Mt Piper extension uses about 1,000ML/year, the storages would last (61,180/(10,780+1000)) = 5.2years, or 6 months less than without the new power plant.

Thus, the addition of an air cooled power plant using about 1,000ML of water from Coxs River system would not impact significantly on the long-term viability of the existing stations. No additional allocation is required and there would be no impact on minimum base flows or other water users on Coxs River.

5.3 Water Management during Construction

5.3.1 Potential Impacts during Construction

During construction, the main water quality impacts from the site would be the export of sediments and other pollutants such as nutrients to the local waterways due to the exposure of soils to erosion. Erosion and sediment control structures and good site practices would be implemented to minimise the potential for adverse impacts on local surface water quality during the construction phase. The proposed mitigation measures to protect water quality during construction are outlined below.

5.3.2 Water Quality Management

In order to reduce the potential water quality impacts of the site during construction, general measures to control erosion of soil and sedimentation would be implemented prior to construction works. These measures would be documented within a Soil and Water Management Plan (SWMP), prepared as part of the Construction Environmental Management Plan, which would be prepared in accordance with the principles and practices in Soils and Construction (Landcom, 2004). Appropriate soil erosion and sedimentation controls would need to be in place during the period of construction until all ground surfaces are stabilised and re-vegetated.

5.3.3 Erosion Control Measures

Erosion control measures generally function by reducing the duration of soil exposure to erosive forces, either by holding the soil in place, or by shielding it. Carrying out earthworks in stages and the sealing of haul roads would minimise the extent of land exposed to erosive forces. Proper management of surface runoff may be accomplished by interception, diversion and safe disposal of runoff in conjunction with staged construction activities. Erosion control techniques are based upon effective use of construction practices, structural erosion controls, vegetative and sealing measures. Erosion control measures would be temporary for the construction phase of the project.

5.3.4 Sediment Control Measures

The installation of appropriate sedimentation and erosion control measures would greatly reduce the quantity of soil eroded and the quality of the runoff from a construction site. However, some erosion would inevitably occur, and measures are therefore required to ensure that eroded material is trapped and retained. Sediment controls that can be applied to the construction site include:

- Sedimentation basins - A key component of the SWMP would be the collection of runoff from disturbed areas and filled ground into suitably sized sedimentation basins. A sedimentation basin is a barrier or dam designed to intercept sediment-laden runoff and retain the sediment. Sedimentation basins must be installed prior to development or construction activity on a site, and should remain in place until such activity has been completed and the land stabilised;
- Sedimentation traps - Sedimentation traps are temporary sediment control structures formed by excavation and/or an embankment to intercept sediment-laden runoff that retain the sediment.

They function by trapping sediment in runoff before it enters stormwater pipes or channels, and are usually located at inlets that receive runoff from only a small catchment. Sedimentation traps have similar functions to sedimentation basins, but differ in that, generally, they are smaller, simpler to construct, relatively inexpensive, and more easily moved as the development proceeds;

- Sediment filters - Sediment filters function by intercepting and filtering small volumes of runoff, which mainly occur as sheet flow. These structures are used below small areas of disturbance, along the boundaries of a development, or at the beginning of vegetative filter or buffer strips. Sediment filters would usually be in the form of straw bale sediment filters, sediment fences, straw bale-geotextile fabric or vegetative filter strips.

5.4 Risks to Water Quality

The existing power station and the proposed extension are located within the Upper Coxs River sub-catchment that is part of the Sydney Drinking Water Catchment. Although the project is not formally subject to the requirements of the *Drinking Water Catchments Regional Environmental Plan (REP) No 1*, the Director-General has requested an assessment of the likely risks to water quality associated with the project consistent with the REP heads of consideration. The assessment considerations in the REP comprise:

For the purposes of section 30 (3) of the Act, the matters that are to be taken into consideration .....in deciding whether to grant concurrence are:

(a) whether the development incorporates any current recommended practices and performance standards endorsed or published by the Sydney Catchment Authority that relate to the protection of water quality, and

(b) if the development does not incorporate those practices and standards, whether the alternative practices that relate to the protection of water quality that have been adopted in relation to the development will achieve at least the same outcomes as those practices and standards, and

(c) whether the development will have a neutral or beneficial effect on water quality.

This clause does not apply if ..... the proposed development:

(a) has no identifiable potential impact on water quality, or

(b) will contain any such impact on the site of the development and prevent it from reaching any watercourse, waterbody or drainage depression on the site, or

(c) will transfer any such impact outside the site by treatment in a facility and disposal approved by the consent authority (but only if the consent authority is satisfied that water quality after treatment will be of the required standard).

In correspondence on the project, the Sydney Catchment Authority also identified issues it wished to be considered in the EA. These are provided in **Appendix A** and are generally consistent with the heads of consideration listed above but provide more specific requirements relating to:

- Cumulative impacts associated with Neubecks Creek;
- Water cycle management to focus on groundwater implications of the management of flyash, details on water quality protection measures, load and concentration for pollutants pre and post construction, an assessment of wastewater discharged downstream from Lake Wallace from Wallerawang Power Station, and anticipated changes to the EPL and WML.

5.4.1 Protection of Water Quality

As described in detail in Chapter 3 and in earlier sections of this chapter water quality is managed on site by a series of treatment processes which allow it to be reused in the operation of the plant. These operation processes will be retained for the existing plant and the use of the proposed extension where practicable.

Where augmentation of the treatment processes is required due to the increased volume of wastewater for treatment, this will be done as part of the construction of the proposed extension. These treatment processes ensure the maintenance of the "zero discharge" policy for wastewater, and only clean stormwater is discharged to Neubecks Creek, under the provisions of the EPL 13007. Similar arrangements would apply for the Mt Piper Extension, with a separate licence and discharge point to Neubecks Creek for surface run-off not collected and reused. It should be noted that the site water balance for the coal option (see **Table 5-2**) assumed rainfall capture would be 117 ML/year. Similar calculations were not presumed for the gas option, but in both cases the collection of rainwater on the site would not only reduce the demand for raw water but also reduce the volume to be discharged to Neubecks Creek.

Groundwater quality beneath the proposed new plant appears to be influenced by mine water moving down gradient from nearby abandoned workings. Observations of rust-staining in drains near the present gate house suggest that this water is acid and iron-charged, although it is noted that groundwater in the floor of a concrete-lined canal beside the main power station entry road is clear.

As described in Chapter 3 ash from the existing plant is located in an ash placement area to the east of the plant. Monitoring of boreholes is undertaken in the ash area to determine groundwater quality. Connell Wagner (2007) reviewed the water quality from those bore holes and compared the results with relevant water quality guidelines (ANZECC, 2000). They concluded that concentrations were generally consistent with guidelines, although elevated trace element and sulphate concentrations are an effect of the underground mine water quality. Brine concentrate from the existing power station operation is currently placed in the existing ash storage area. Up to 16 ML/yr of brine is produced as a product of the treatment processes in the plant and is used in the ash placement area to condition the ash to aid in its placement. This reduces the volume of water required for ash conditioning. The brine is held in the pore space within the placed ash and only a small part of it is released (Connell Wagner, 2007). Monitoring of surface and groundwater has shown that the ash placement provides an effective containment for the brine.

Regardless of whether the coal or gas option is selected for the project, Delta is seeking to extend the area available for ash placement (and consequently the area for brine disposal). The extension to ash placement areas is being addressed in a separate planning application and the processes proposed will be described fully in that application. For the purposes of this assessment, it is reasonable to indicate that the design and application of water management controls would be similar to those already in operation for the existing plant.

As described in Section 5.3 the management of water runoff during construction would be consistent with existing guidelines (Landcom, 2004). Full details would be provided in a Soil and Water Management Plan prepared and approved prior to construction.

5.4.2 Effects on Water Quality

The proposed extension will seek to retain the “zero discharge” criteria established for the existing plant operation. The retention of the water recycling and site management processes described above would ensure that there should be no change in water quality in receiving waters (surface or ground water) compared with existing operations. As the stormwater to be discharged would be clean and discharge point for clean surface waters is in the upper part of the sub-catchment, there would be no cumulative effect on Neubecks Creek from this. The runoff via groundwater to Neubecks Creek in the area of the proposed ash storage would be fully assessed in the separate application for the extension to the ash placement areas. The maintenance of the same level of control should, however, ensure that cumulative effects would be able to be managed.

An assessment of wastewater discharged downstream from Lake Wallace from Wallerawang Power Station is beyond the requirements for the scope of this study.

It is anticipated that the terms of the EPL and the requirements for the WML would be consistent with those existing. They would be negotiated at the appropriate time.

5.5 Conclusions

The existing Mt Piper Power Station is a wet cooling system and therefore uses significant amounts of water, but within the requirements of its existing Water Management Licence. The proposed extension, whether coal or gas, would be a dry cooling system, and as a consequence extra water requirements would be limited to no more than 1,100 ML/yr. The ongoing use of mine water would ensure no additional drawing on the Coxs River or Fish River Supply Schemes beyond the existing licence arrangements.

The water treatment system for the existing power station operates such that zero discharge from process and potentially contaminated areas to the environment is achieved. The existing waste water treatment system will provide for the proposed extension, although some augmentation will be required to accommodate the limited, extra flows. There will be no change to the "zero water discharge" principle for the new plant.

To reduce the potential water quality impacts of the site during construction, general measures to control erosion of soil and sedimentation would be implemented prior to construction works. These measures would be documented within a Soil and Water Management Plan (SWMP), prepared in accordance with the principles and practices in Soils and Construction (Landcom, 2004).