NSW GOVERNMENT | Planning

MAJOR PROJECT ASSESSMENT
Mount Piper Power Station Extension

Director-General's
Environmental Assessment Report
Section 75I of the
Environmental Planning and Assessment Act 1979

December 2009

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EXECUTIVE SUMMARY

Delta Electricity (the Proponent) has lodged a concept plan application for the construction and operation of the Mount Piper Power Station Extension Project, located within the Lithgow local government area. The power station will be capable of generating up to 2000 Megawatts of electricity. The project includes the installation of new gas or coal-fired power generators and will utilise some infrastructure of the existing Mount Piper Power Station, including transmission and water supply infrastructure. The project is proposed to connect to TransGrid's 500kV switchyard, which has been constructed and due in service during the year 2010. The transmission infrastructure is not part of this concept plan application.

The project will use existing infrastructure from the Mount Piper Power Station Units 1 and 2, for water and waste management systems. The volume of water required for the proposal meets the existing availability of water from the water supply sources. No changes to the existing Water Management Licence or other agreements would be required to provide water for the proposal. The operation of the power station, under either coal or gas fuelled options, would produce water quality pollutants. Should it be determined at the project application stage, that the existing Mount Piper Power Station is unable to accommodate the extra flow from the proposal, an independent collection and separation system would be provided.

For the coal-fired option, small solid particles of ash and soot referred to as flyash would be generated from the burning of coal. The Proponent is currently investigating new areas for the placement of this ash produced. These new areas would accommodate the ash produced from the existing Mount Piper Power Station and this proposal, should coal be the preferred option. The investigation for options of new ash placement areas is subject to a separate major project application, for which the Director-General's Requirements were issued on 12 November 2009.

With regards to the supply of fuel, for the coal-fired power station, coal would be sourced from the competitive market including both local mines and suppliers from a wider region. For the gas-fired power station, gas would likely be delivered to the power station via a lateral pipeline system from the existing Moombah to Sydney Pipeline. Gas supply infrastructure is not part of the concept plan application, the assessment for such infrastructure would be subject to a separate project application.

The electricity generated by the project would cater for electricity demand expected within the next ten years. The project will manage the risk of the expected energy generating shortfall, if and when it eventuates. The project has a capital investment value of $2.6 billion to $5 billion and will employ up to 950 during its construction and up to 50 during its operation.

The Department received 369 submissions during the public exhibition period of the Environmental Assessment, of which 357 were from the public. The majority of the public submissions received opposed the proposal. The main issue raised in the submissions related to the need for the project based on greenhouse gas emissions and climate change concerns and the use of alternative, renewable technologies. The other main issues raised related to air quality impacts to the local area and water supply and availability for the proposal. In response to the submissions received, the Proponent prepared a Submissions Report, which was submitted to the Department. The Department also commissioned independent reviews of the Proponent's greenhouse gas, air quality and noise assessments.

The Department's assessment of the proposal is detailed in Chapter 5 of this report, and concludes that the project in concept could be undertaken within acceptable environmental and amenity limits subject to the implementation of recommended conditions. Specifically in relation to greenhouse gas minimisation, the Department has recommended a specific condition of concept approval to require the Proponent to, on a triennial basis, evaluate and report on the availability of viable greenhouse gas reduction, mitigation and/or offset options for incorporation into the final project design taking into consideration relevant contemporaneous economic drivers including any applicable legislation such as an emissions trading scheme and updated electricity demand and supply projections. The Department has also required as part of this condition that the report is made publicly available to ensure transparency in the process and to enable the public to have access to the information presented.

With regard to greenhouse gas impacts, the Department considers that the assessment undertaken is sufficient to provide an indication of the likely greenhouse gas emissions resulting from the proposal. It is noted, however, that additional detail will be required as part of a project application to confirm these impacts, and the Department has recommended conditions of approval to this effect. While there will be an increase in the total greenhouse gas emissions in NSW from either a coal or gas facility, the impact of these emissions must be balanced against the risks associated with an electricity generation shortfall and the significant social and economic implications to the State should such a situation eventuate. Therefore on balance, the Department has recommended for this stage of concept approval, a number of conditions which require the Proponent to clearly demonstrate that best practice technology is to be implemented to minimise greenhouse gas emissions, and to demonstrate that they are investigating carbon reduction technologies that could be feasibly retrofitted to the plant, as well as other emission reduction or offset measures, to reduce or offset greenhouse gas emissions.

In relation to air quality impacts, the Department has recommended the Proponent prepare an updated air quality assessment to confirm the air quality emissions associated with the final project design with consideration to worst-case meteorological and operating condition and taking into consideration contemporaneous operations of the existing Mount Piper and Wallerawang Power Station and other relevant land uses in the locality. The Department notes that the Proponent has committed to select and maintain plant equipment in a manner that ensures pollutant concentrations will meet the air quality criteria.

The Department has also recommended that the Proponent prepare an updated noise assessment, in accordance with nominated guidelines. The Proponent's noise modelling results (the predictions), were found to exceed the project-specific noise goals by up to 4 dB(A) for the coal-fired option and 5dB(A) for the gas-fired option. The Proponent stated that the main reason for this difference is that predictive noise levels of the recently approved Western Rail Coal Unloader were used in the modelling, rather than actual noise data, as it is not yet built. However the Department, after consultation with the Department of Environment, Climate Change and Water, has recommended operational noise limits that align with the project-specific noise goals. The Department is satisfied that the Project can be designed to meet these noise goals. The Department has also recommended that the Proponent prepare a comprehensive cumulative noise amenity assessment of existing developments, approved developments and the Project, relative to the nearest sensitive receivers. The Department finds that this further assessment requirement relevant to a project application for the preferred option will ensure that the cumulative noise levels to be generated within the vicinity of the proposal site, can be further assessed to ensure that noise can be controlled and meet the acceptable amenity criteria at the residential receiver locations.

Based on the Department's assessment of the Project, the Department recommends that the Minister grant concept approval to the project, subject to the recommended conditions. These recommendations have been framed for the purposes of conducting further assessment of the identified key environmental and amenity impacts, should the Proponent lodge a project application for the preferred option.

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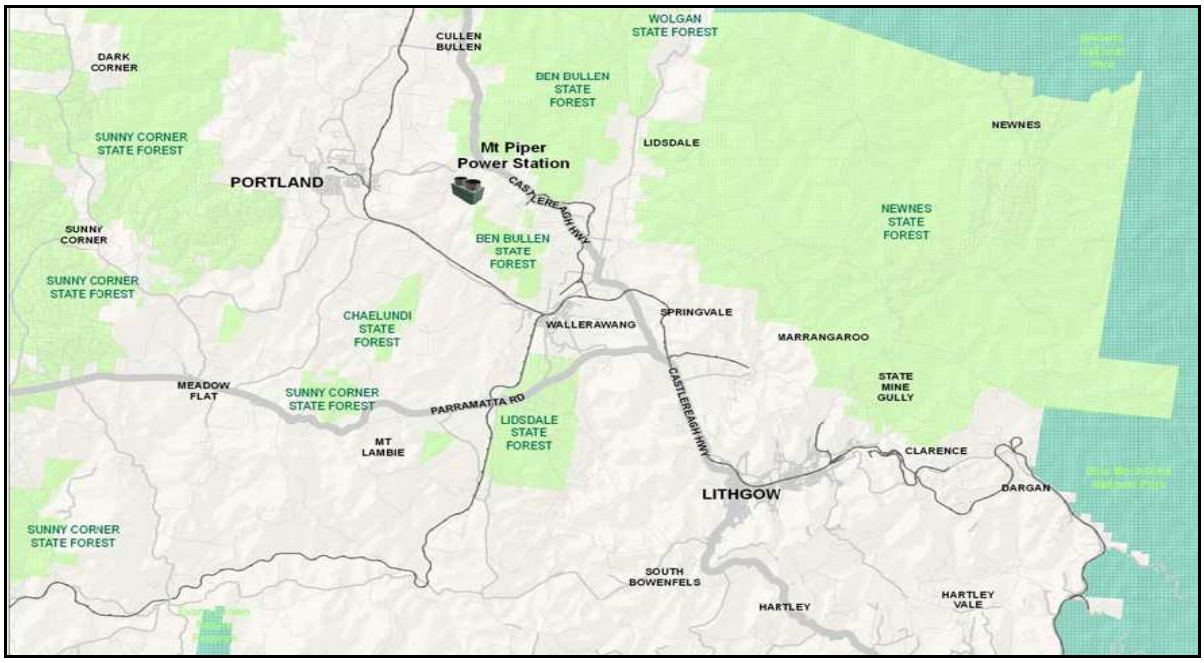
1. BACKGROUND

1.1 Location

Delta Electricity (the Proponent) proposes to construct and operate a base load power station and associated infrastructure adjacent to the existing Mount Piper Power Station. The proposed power station (known as the Mount Piper Power Station Extension Project or the Mount Piper Extension Project) would be fuelled by either natural gas (using combined cycle technology) or by coal (using ultra supercritical coal technology) and have a generating capacity of up to 2000 megawatts. The project site is located in central-west of NSW, at 350 Boulder Road, Portland, within the Lithgow local government area. Figure 1 below shows the regional location of the project site.

Figure 1: Site Location (reproduced from the Proponent's Environmental Assessment)



1.2 Existing Site

The Project is proposed on a site which is occupied partly by the existing Mount Piper Power Station Units 1 and 2, which is owned and operated by Delta Electricity. The Project would be located on this site, generally to the west of the existing power station, in an area originally prepared in the 1980s for the installation of the third and fourth coal-fired generation units for the existing power station, however these were never built. Figure 2 shows the existing site features and the proposed power station areas.

1.3 Surrounding Land Use

The project site is situated approximately 17 kilometres north-west of Lithgow. The area surrounding the site is bushland and rural industry, including agricultural farming, forestry and coal mining. The nearest townships are Blackmans Flat approximately three kilometres to the east, Portland, located approximately four kilometres to the west and Wallerawang, approximately six kilometres to the south-east. The existing Mount Piper Power station is located adjacent to the proposal site and is shown in Figure 2. The nearest residential properties to the proposal site have been identified as location A (Back Cullen Rd, Portland, 1700 metres), B (Humphrey Street, Portland, 2800 metres), C (Irondale Road, Pipers Flat, 1800 metres), and D (Noon Street, Blackmans Flat, 2800 metres) by the Proponent. Figure 3 shows these locations and the surrounding land, location A is the closest to the area in which the proposed construction activities would take place.

Figure 2: Aerial View of the Existing Power Station and the Proposed Power Station (reproduced from the Proponent's Environmental Assessment)

Figure 3: Location of the Closest Towns - Portland with a Distance of Four Kilometres to the West and Blackmans Flat Three Kilometres to the East of the Proposal Site (Reproduced from the Proponent's Environmental Assessment)

2. PROPOSED DEVELOPMENT

2.1 Project Description

The existing Mount Piper Power Station, which comprises of two 700-megawatt steam turbine generators (known as Units 1 and 2) driven by steam provided from coal-fired boilers, is located on the proposal site, which is owned and operated by the Proponent. The project would be located on the same site, generally to the west of the existing power station.

The Proponent proposes to now construct and operate a new base load power station and associated infrastructure adjacent to the existing Mount Piper Power Station Units 1 and 2 facility, i.e. within the area originally designed for Units 3 and 4. As part of the concept plan application for the new facility, the Proponent has proposed two fuel options for electricity generation. The power station would be fuelled by either natural gas (using combined cycle technology) or by coal (using ultra supercritical coal technology) and have a generating capacity of up to 2000 megawatts. For a coal-fired power plant, coal would be sourced from the competitive market including both local mines and suppliers from a wider region. For a gas-fired power station, gas would likely be delivered to the plant via a lateral pipeline system from the existing Moombah to Sydney Pipeline. It must be noted that the concept plan application does not include gas supply infrastructure and should the Proponent seek project approval for the gas-fired option, the assessment for such infrastructure would be subject to a separate project application.

The project would include the new power plant, comprising of gas or coal fired power generators and utilise some infrastructure of the existing Mount Piper Power Station, including transmission and water supply infrastructure.

2.2 Power Station Fuelled by Natural Gas

The Plant and its Operation

Under the gas-fuelled option, the Project would comprise of up to six gas-fired combined cycle blocks, with a total net nominal capacity of 2,000 megawatts.

Combined cycle plants utilise a gas turbine and a steam turbine to drive an electrical generator. The gas is then fired in an open gas turbine and hot exhaust gases generated from the gas turbine feed into a heat recovery steam generator, which produces steam to drive a conventional steam turbine. The Proponent proposes that the combined cycle units be built as single shaft blocks. This means that the gas turbine and steam turbine would drive a common generator (the steam turbine is coupled to the same shaft as the gas turbine). The new power station would comprise the installation of up to six units. The facility will exhaust combustion products at a low temperature via a stack or stacks with a nominal height of approximately 60 to 80 metres above ground level. Air cooled condensers would be used to condense the steam leaving the steam turbines to minimise water usage.

The Proponent would either build the extension by utilising some existing infrastructure or build it as a completely stand alone power generating facility. Any shared services between the existing and proposed power station would be the existing domestic sewage system and access to the site. It is also possible that liquid wastes would be sent to the existing plant for disposal or for use within that plant in order to reduce demand associated with the existing Mount Piper Power Station Units 1 and 2 facility.

Water Management and Supply

The Proponent would utilise a similar water management system to the existing Mount Piper Power Station for the project. This being all potentially contaminated water is to be treated and reused on site and only clean, uncontaminated water is to be discharged to Neubecks Creek, via a holding pond which may have an underflow weir. The Proponent would seek to obtain an Environment Protection Licence for the discharge of stormwater drainage from a discharge point. Wastewater would be routinely handled with on-site treatment and neutralisation and any resultant effluent reused on site, disposed of to the existing power station or collected and disposed of by a licensed contractor. Another option proposed is for the wastewater to be directed to the existing wastewater treatment plant of the existing power station. The Proponent is yet to determine which one of these two methods of wastewater treatment and management options is to be utilised.

3Water would be required for domestic purposes, fire fighting, maintenance and washdowns, make-up to the water stream cycle, evaporative coolers (if fitted to the gas turbines to increase gas turbine output on the hottest days) and spray-assist water to the air cooled condenser to try to maintain a low steam turbine back pressure during the hottest days. The Proponent states that these activities would require minimal water (approximately 271 ML/year of demineralised water and 460 ML/year of raw water) and therefore water can be obtained from nearby mine workings, being the Springvale Colliery.

Transmission Infrastructure

The Proponent proposes to connect the Project to TransGrid's 500kV switchyard, which has been constructed and due in service during the year 2010. The gas turbines (up to six) would be grouped into two sets of transformer yards with a generator transformer for each gas turbine and then will connect via overhead 500kV lines to the breaker-and-half bays in the 500kV switchyard. Alternatively the Proponent states that all generator transformers could be located in the one transformer yard with two 500kV overhead lines connecting to the 500kV switchyard. The transmission infrastructure is not part of this concept plan application.

Gas Supply Infrastructure

A new gas pipeline to the site from gas sources or to pipelines already connected to the gas sources would be required to be built, should the Proponent seek and obtain project approval from the Minister for the gas-fired option. The potential gas sources include the Gippsland and Cooper Basins. As stated above, the gas supply infrastructure is not part of the concept plan application as the Proponent is yet to determine the option preferred, location and approval processes for gas supply infrastructure at this stage. However to demonstrate a new pipeline is feasible, the Proponent has assumed that the pipeline would take-off from the existing Sydney Moombah Pipeline at Young, and follow on the same easement as the existing Young to Lithgow Pipeline via Cowra and Blayney, then leaving the existing easement west of Lithgow to travel along road easements (such as the Castlereagh Highway) to the project site. The Proponent has determined that the existing Young to Lithgow Pipeline is not adequate to supply the amount of gas required for the project. A new pipeline would be at least 457 millimetres in diameter, and would be required to deliver approximately 133 petajoules of gas per annum to the project. This estimation has been made based on the proposed plant (under the gas-fuelled option) operating at a 95 percent capacity factor. Associated infrastructure for the construction and operation of the new gas pipeline would also be required, for example a meter pressure regulating station consisting of equipment to operate and monitor the gas flow through the pipeline.

2.3 Power Station Fuelled by Coal

The Plant and its Operation

The new power plant would consist of two power generators within the benched area previously prepared during the construction of Units 1 and 2 of the existing Mount Piper Power Station. The benching would need to be extended to the west and south to accommodate the air cooled condensers and as a result road deviations would be needed, with the diversion of services and drains in the project area. Listed below are the components that will be required on site, as part of the coal-fired power plant option.

- A turbine house area
- Air cooled condensers
- Generator transformers and overhead lines
- Boiler house and fabric filters
- Bottom ash and flyash handling plants
- Flyash conveying route to ash storage areas
- Coal handling plant, storage area and conveyors
- Oil separator and contaminated water pits
- Main roadway and diversions
- Area allocated to the future Carbon Capture Plant

The proposed power station would generally be stand alone, utilising only those resources of the existing Mount Piper Power Station where given the existing occupancy of the site, it is impractical to do otherwise. These resources include the water supply infrastructure, the future Pipers Flat rail coal unloader and associated conveyor, the extension to the existing ash storage area (which is subject to a separate major project application) to meet the needs of the existing power station units (Units 1 and 2), and waste water treatment facilities.

The coal will be pulverised and used to fire the two new boilers. Ash would be collected and transported by conveyor or truck to the ash storage areas and flue gas would be emitted to the atmosphere via a single stack, approximately 250 metres in height. The steam generated by the boilers would be routed to the high pressure turbine, where some of the heat energy would be converted to mechanical energy. The steam would then return to the boiler for reheating before it flows through intermediate pressure turbine and then to the low pressure turbine, to convert more of the heat energy into mechanical energy. Steam discharged from the low pressure turbine would pass to direct dry air cooled condensers to be condensed to water before it is returned to the boiler by way of feed heaters, which use steam extracted from the turbines. Fan-forced air flow would dissipate heat to the atmosphere. The proposal would operate on a continuous basis (24 hours a day, seven days a week).

The proposed plant would use ultra-supercritical technology (the existing Mount Piper Power Station uses subcritical technology) for the boiler steam cycle, which will increase the efficiency and minimise the level of greenhouse gas emissions from coal being burnt. The power plant would also use air cooled condensers (rather than evaporative cooling towers as used for the existing Mount Piper Power Station) to eliminate the consumption of water for steam condensing.

Transmission Infrastructure

The electrical power output of the proposed power station would be delivered via step-up generator transformers, to TransGrid's new 500kV switchyard, adjacent to its existing 330kV switchyard. This is the same proposed transmission infrastructure to be used for the gas-fuel option, as detailed in section 2.2 of this Report.

Fly-ash and Furnace Conveyance and Disposal

The end products of electricity generated by the fuel coal are heat, carbon dioxide and flyash. Flyash is small solid particles of ash and soot, generated when coal is burned. It is suspended in the flue gas after combustion. The existing Mount Piper Power Station uses a fabric filter system that captures over 99.9 per cent of flyash, which is stored in open mine voids. For the proposed development, a new extraction and transportation system using dry compressed air, as the transport medium is proposed to extract flyash from the fabric filter hoppers and transport it to a proposed flyash storage silo. The new flyash silo providing storage for the proposed plant's by-products would be required and the silo would be equipped with a truck loading facility to allow truck transport off-site or to the disposal areas.

Approximately 20 per cent of the flyash produced from the existing Mount Piper Power Station is sold to a company that markets and sells the ash to industry. This ash is transferred from the existing flyash silo to the company's on-site plant. A bypass conveyor is retrofitted to the flyash silo to allow the transfer of ash to trucks rather than the conveyors. The Proponent has stated that should a market be found for some ash re-use, such as selling the ash to a cement company, a similar arrangement for ash transportation would be provided in the proposed silo. The majority of the ash produced from the existing power station is stored in the ash placement area (open mine voids). This ash is transported to the area by enclosed belt conveyors. When the conveyors are out of service, ash is taken by truck to the ash placement area.

The ash placement area for the existing power station is the former Western Main open cut mine void, adjacent to the power station (known as Disposal Area 1). Disposal Area 1 has accommodated ash placement since the power station was commissioned in the year 1992-1993. The Proponent has noted to the Department that the Disposal Area 1 will reach full capacity in approximately five to six years time (i.e. by the year 2015), which is well before the existing power station reaches the end of its economic life. The Proponent is currently investigating alternative areas for the placement of this ash produced. These new areas would also accommodate the ash produced from the proposed development. The investigation for options of new ash placement areas is subject to a separate major project application, for which the Director-General's Requirements were issued on 12 November 2009.

Water Treatment and Disposal

The Proponent states that as the project will be using air cooled condensers, as opposed to evaporative cooling, there will be no requirement for large scale blowdown water treatment plants. The Proponent states that a small volume of water will require treatment (approximately 215 ML/year) and may be treated in the existing Reverse Osmosis and/or Brine Concentrator Plants of the existing Mt Piper Power Station, however

additional facilities such as a Contaminated Control System, would be required to allow the water from the existing Mount Piper Station Units 1 and 2 and proposed Mount Piper Station Units 3 and 4 to be treated independently from one another.

Pure water, referred to as demineralised water of low conductivity, will be used for the steam generating cycle during operation of the proposed plant. The proposal would require three new demineraliser trains (two to operate for the worst case operation and one to be a standby and used if one of the two trains comes out of service for maintenance). The worst case operation would be maximum weekly demineralised water usage of the existing units (existing power station), coinciding with maximum weekly usage for the additional new units.

For all other operational purposes, the same water disposal procedure described for the proposal under the gas-fuelled option (refer to section 2.2 of this Report), also apply to the coal-fuel option. This being, the Proponent would incorporate clean and contaminated water diversion areas, where the contaminated water would be treated and the clean water would be drained to Neubecks Creek via a discharge point.

Coal Supply and Infrastructure

Coal would be sourced from a competitive market including both local mines and suppliers from a wider region to the proposal site. The coal would likely be transferred via rail to the recently approved, however not yet built, coal unloader at Piper's Flat. The rail coal unloader project was subject to a project application under Part 3A of the *Environmental Planning and Assessment Act 1979* (the Act) and was approved by the Minister on 27 June 2009. The rail coal unloader project was proposed independently of the proposed development and its need was based on the reduced availability in the future of locally mined coal. It is proposed that coal would be sent by conveyor from the railway facility to a proposed coal handling plant at the proposal site. The conveyor would also provide coal to the existing coal handling plant (existing Mount Piper Power Station).

2.4 Carbon Capture Readiness

The Proponent has allocated an area of the proposal site to potentially capture greenhouse gas emissions from the plant in the future by employing Carbon Capture Technology. This technology is based on capturing the emitted carbon dioxide from the power plant and then potentially storing it away from the atmosphere permanently.

The Proponent has acknowledged that Carbon Capture ready technology will not be commercially available by the time the proposal reaches its detailed design phase. For this reason and the need for further investigation with regards to the capability of storing the carbon dioxide, the Proponent's concept plan application does not include approval for a Carbon Capture Plant, rather includes allocation of an area for such technology. This is because the Proponent intends, as part of the proposal, to make the proposed power plant "carbon capture ready" by providing a layout space to retrofit a carbon capture plant in the future, and to accommodate future requirements of the capture plant. Figures 4 and 5 show the area that has been allocated by the Proponent to ensure the proposal has the ability to utilise the Carbon Capture Technology once it becomes commercially available and viable to use.

2.5 Project Need and Justification

The issue of whether additional base load electricity generation is needed, the justification for proceeding with a fossil-fuelled power station now or in the future and the balance between the benefits (and "disbenefits") of a such a generator compared with alternative measures to address energy demand have been issues of substantial debate since inception of the current proposal. It is clear from submissions received in response to the subject application that the issue of justification of the proposal, particularly in light of alternative energy supply measures and the impacts of climate change, are of significant public concern (89 per cent of all comments made in submissions relate to these issues).

Figure 4: Plant Layout for the Combined Cycle Gas Turbine Option, showing the Designated Area for the Future Housing of Carbon Capture Technology

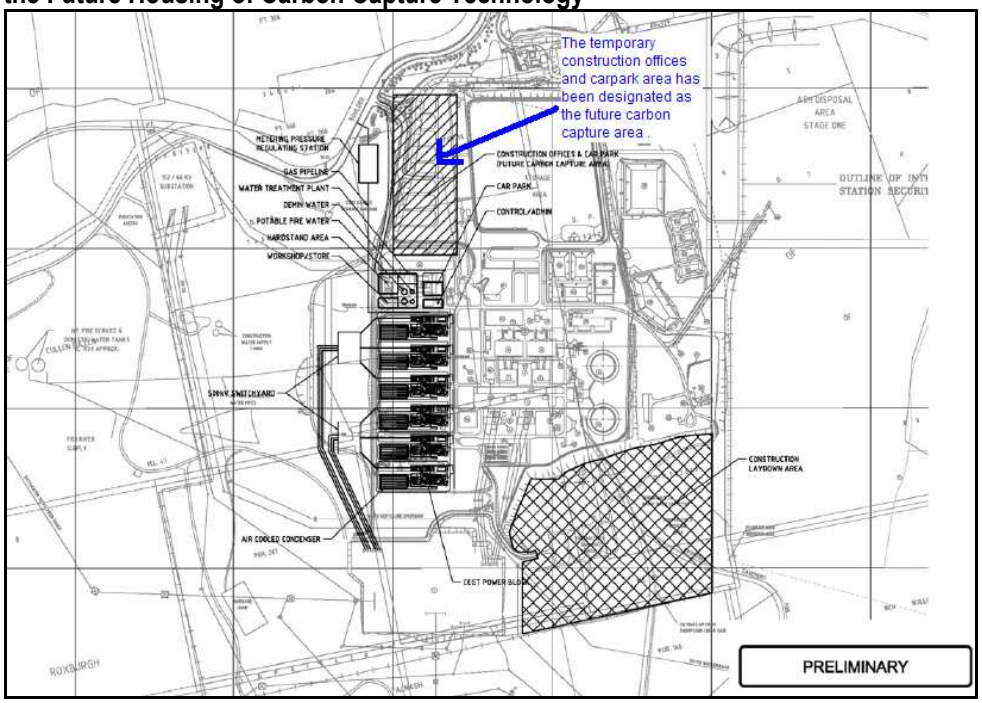
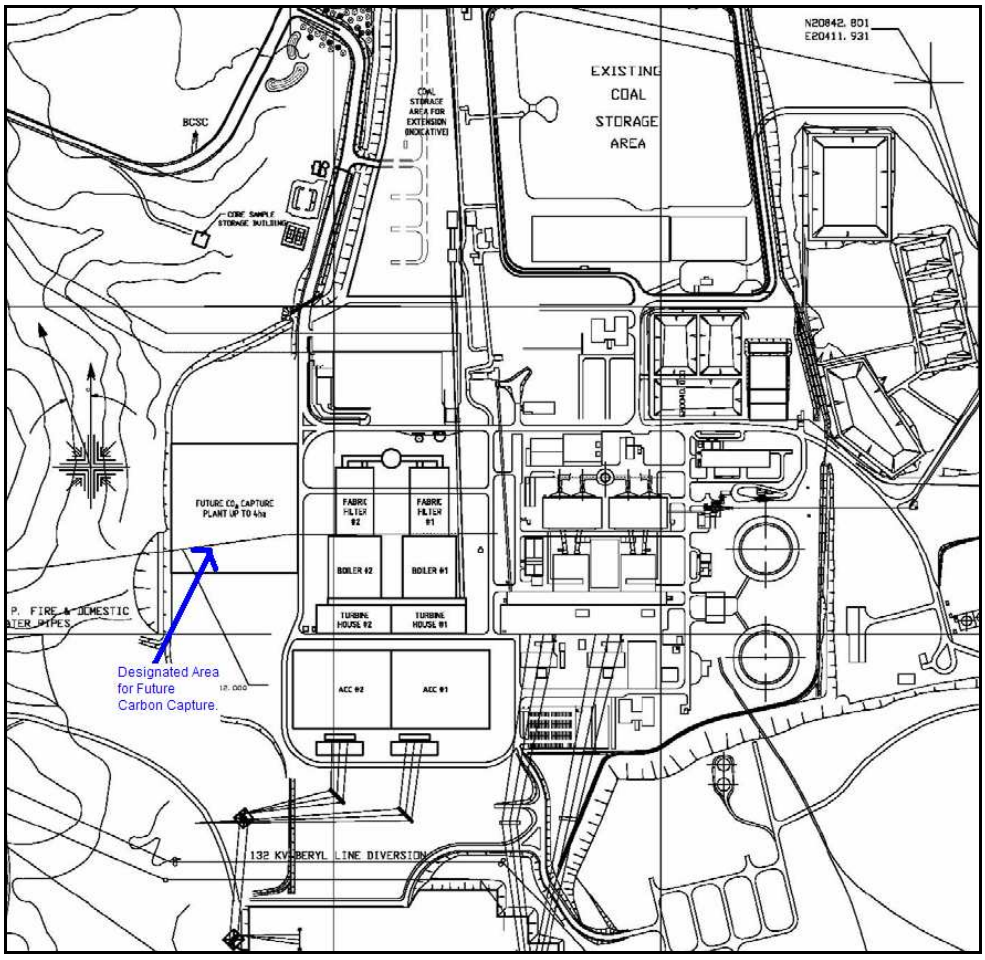


Figure 5: Plant Layout for the Coal-Fired Fuel Option, showing the Designated Area for the Future Housing of Carbon Capture Technology



Public sentiment on the proposal has been strong, with a focus not only on the impacts of climate change, but also questioning the need for additional base load electricity generation. Submissions consider that the Government has not adequately consulted with the public over the need and justification for additional (fossil-fuelled) base load power, and whether such a power station is preferable in light of alternative electricity supply and demand management measures, which may be less greenhouse intensive.

While the Department considers that the direct environmental impacts associated with the proposed power station can be mitigated and managed to achieve acceptable environmental outcomes, the strength of sentiment in public submissions suggests that implementation of either the coal- or gas-fired option, whether now or in the future, is likely to meet public opposition, irrespective of how the proposal may be modified or amended.

The Department considers that an assessment of the need and justification for the proposed power station must begin at first principles and be undertaken in the context of the essential nature of energy and a robust approach to risk management. In undertaking such an assessment, the Department considers that arguments around need and justification are based in analysis of four key points:

1. the need for, and timing, of additional electricity generating capacity;
2. the consequences of not providing additional electricity generating capacity at the appropriate time;
3. the role of diversity and alternatives in a robust risk management framework; and
4. consideration of the temporal nature of regulatory and market-based issues.

Need for and Timing of Additional Electricity Generating Capacity

Owen Inquiry into Electricity Supply in NSW (2007)

On 9 May 2007, the then Premier announced the establishment of the Inquiry into Electricity Supply in NSW, and the appointment of Professor Anthony Owen, professor of energy economics at the Curtin University of Technology, to undertake the Inquiry (now commonly referred to as the "Owen Inquiry"). One of the terms of reference for the Owen Inquiry required a [r]*eview of the need and timing for new baseload generation that maintains both security of supply and competitively priced electricity*. The Owen Inquiry Report was finalised and publicly released on 11 September 2007.

The Owen Inquiry Report (Owen, 2007) presented a comparison and analysis of energy demand forecasts (based on data from the 2007 Transgrid Annual Planning Report) and an expected maximum energy capability of New South Wales power generators. Owen made a number of reasoned assumptions about the achievable capacity factors of generators, the future status of some generators (including the decommissioning of Munmorah and the commissioning of Colongra, Tallawarra and Uranquinty power stations), the future potential for inter-regional transfers with Queensland and Victoria and the capacity for energy demands to be reduced through energy efficiency savings. Taking all of these factors into account, the Owen Inquiry Report estimated that additional energy generation of approximately 9,500 GWh may be required to supply New South Wales by 2013/14 (10,500 GWh if energy efficiency measures are not taken into account). Based on the lead times associated with the construction of new power generating facilities (particularly coal-fired, and to a lesser extent, gas-fired power stations), the Owen Inquiry Report recommended that measures be taken to ensure that additional generating capacity was available by 2013/2014. Such measures include securing relevant environmental and planning approvals.

As with any predictive exercise that seeks to determine the position of a complex system at some point in the future, Owen's attempt to pinpoint the time in future at which New South Wales may require additional generating capacity carries with it the cumulative uncertainties of each of the assumptions on which it is based. Owen's task in this case was made even more challenging by the fluid and evolving nature of the energy policy, regulation and markets. While any one of the many assumptions that went into Owen's considerations may be debated by the relevant stakeholders, the Department considers that such debates do not shift the broader, fundamental findings presented in the Owen Inquiry Report and reiterated in Owen's separated response to criticisms of that report (Owen, 2009):

1. based on forward projections of energy demands, there is expected to be a point sometime in the next five to ten years where energy demands will exceed energy generation capacity;
2. energy efficiency measures, carbon pricing and renewable energy initiatives have the potential to offset growing energy demands; and

3. if growing energy demands are not fully offset by measures such as these, then New South Wales needs to be prepared for investment in additional generating capacity. This means having additional 'shovel-ready' generating capacity available for implementation if and when it is required, and by corollary, taking steps now to ensure 'shovel-readiness' in future.

The Department considers that these fundamental principles are sound, and should form the basis of consideration of the Mount Piper Power Station Extension project (as well as the two other baseload power stations currently under assessment: the Bayswater B and the Munmorah Refurbishment). In the Department's view, Owen identified a future risk of an energy generating shortfall and recommended that the State be in a position to manage that risk, if and when it eventuates.

Recent Transgrid Annual Planning Reports (2008-2009)

Since the Owen Inquiry Report (based on a medium economic growth scenario in Transgrid's 2007 Annual Planning Report supporting a forecast 1,600 GWh per annum growth in energy demand), Transgrid's Annual Planning Reports have presented a decline in forecast energy demand growth. In 2008, this figure had fallen to approximately 1,400 GWh (Transgrid, 2008: 3) and is currently approximately 1,200 GWh (Transgrid, 2009: 3). The two key factors contributing to these reductions in forecast energy demand growth are a lower economic growth outlook and allowances made for the phasing out of incandescent light bulbs, accelerated uptake of solar hot water systems and small-scale rooftop photovoltaics (Transgrid, 2008: 21; Transgrid, 2009: 19). In its most recent Annual Planning Report, Transgrid has also highlighted a predicted reduction in forecast scheduled energy demand based on assumed 'much stronger energy contributions from non-scheduled generators, particularly wind farms' (Transgrid, 2009: 22).

In both the 2008 and the 2009 Annual Planning Reports, Transgrid also highlights the uncertainty around the timing, scale and effect of the Commonwealth Government's Carbon Pollution Reduction Scheme (CPRS). The CPRS has the potential to affect electricity prices, and demand for electricity, but the extent to which this effect presents itself will depend on the timing of the CPRS and, more significantly, the net carbon reduction outcome targeted by the Scheme.

Current Australian Energy Market Operator Statement of Opportunities (2009)

Based on forecast energy demand growth consistent with Transgrid's medium growth estimate (Transgrid, 2009), among other contributing sources, the Australian Energy Market Operator (AEMO) has prepared and published the annual Statement of Opportunities for 2009. In that report, AEMO predicts that low reserve conditions (LRC) may occur in New South Wales during 2015/2016, and that the additional capacity requirement at that time would be approximately 182 MW (AEMO, 2009). In its simplest terms, the LRC point is the time at which the network reliability standard may not be met, and at which point loadshedding may be required and brown-outs may occur in some areas. It is important to note that the LRC does not equate to widespread blackout conditions, although continued demand growth beyond the LRC without provision of additional generating capacity increases the need for loadshedding and exacerbates issues with the quality and reliability of supply (ie brown-out extent, severity and duration).

The predicted 2009 LRC point in 2015/2016 is a revision from the 2008 estimate of 2014/2015, principally due to the commissioning (or expected commissioning) of a number of gas-fired power stations in New South Wales (including Uranquinty, Tallawarra and Colongra) and the expected completion of the upgrade to the Eraring power station. The 2009 LRC is also a revision from the Owen Inquiry estimate of 2013/2014 and also the 2007 Statement of Opportunities LRC in 2013/2014. A key assumption applied in the 2009 Statement of Opportunities (as with previous Statements and in the case of the Owen Inquiry) is the decommissioning of the Munmorah power station around 2014/2015, with a consequent reduction in New South Wales generating capacity of 600MW.

Expected Timing of Additional Generating Capacity Requirements

It has only been two years since the publication of the Owen Inquiry Report, but during that time, the predicted timing of a generation capacity in New South Wales has similarly shifted by two years. This in itself is sufficient to suggest that a level of caution should be applied to predictions made about events five to ten years into the future, based on several assumptions which themselves carry levels of uncertainty. Further, the changing regulatory, policy and market setting for electricity generation in New South Wales and more broadly across the

National Electricity Market is another significant factor that has the potential to substantially and rapidly affect future predictions.

It is in this context that the Department considers that estimates of the New South Wales LRC point in 2015/2016 should be viewed with requisite caution and as a current 'best guess' estimate. On the one hand, this estimate may prove to be too early if significant progress is made with demand management, energy efficiency, new (and currently approved) additional generation capacity, and if domestic and international economic activity remains depressed. Further, if refurbishment and continued operation of the Munmorah power station is approved and proceeds, the LRC is likely to be pushed back by a number of years. However, and equally, the 2015/2016 date may prove to be too late if update of demand management and energy efficiency measures is less vigorous than expected and if there is a significant improvement in economic activity (for example, if Trangrid's high economic growth scenario eventuates, rather than the medium/ base scenario). On this latter point, the Department also highlights that demand growth predictions and estimates of the New South Wales LRC point have not accommodated any potential for sudden significant increases in demands, as may be expected with the establishment of major new energy-intensive developments or industrial complexes. As an example of this, the existing Tomago Aluminium smelter has a constant energy demand of 900MW – establishment of another (hypothetical) energy-intensive industry such as the smelter has the potential to shift the LRC *forward* by several years. In short, it is prudent to bear in mind that energy supply-demand balances have been based on extrapolation of current and historical information (with some reasoned accommodation of variability and change over time), and that potentially-different future conditions (relative to the assumptions underpinning the forecasts) may change the conclusions reached by Owen, Transgrid and AEMO.

Based on this reasoning, the Department considers it prudent to take a broad, strategic approach to the issue of timing of additional generating capacity by accepting that such additional capacity *may be required* at any point in the period 2014-2020. That is to say, additional generating capacity should be available for implementation within that period, *if required*, rather than conclusively determining a date for implementation at this time. To do otherwise is to fail to recognise that estimates such as the LRC point are not fixed and determinative, but rather constrained by the uncertainties inherent in the assumptions around matters such as future market conditions, domestic and global economics, demand management and energy efficiency uptake. This approach is consistent with the Owen Inquiry recommendations, and Owen's own clear distinction between the need to be *prepared* and the act of *implementation* (Owen, 2009: 575).

Consequences of Not Providing Additional Generating Capacity

The Department considers that the consequences associated with reaching the LRC point in New South Wales, and the consequences of potentially going beyond that point, are fundamental to contextualisation of the need and justification arguments for the project. As noted above, low reserve conditions represent the point at which the National Electricity Market Reliability Standard may not be met – that is, less than 99.998% of consumer demand is met (or alternatively, that annual levels of unserved energy demand over the long-term exceed 0.002%). It is at this point that network intervention may be required to loadshed.

Any loadshedding event will have negative economic and/ or social impacts, and in some circumstances may even have negative environmental impacts (including, for example, the impacts associated with alternative, temporary power supplies). Around the LRC point, these negative impacts may simply be no more than inconvenience, with the net economic loss potentially being limited. However, beyond the LRC point continued growth in demand will place greater pressure on the network and will ultimately lead to more significant impacts. While any loadshedding that may occur across the network under these circumstances will be managed and undertaken in a controlled manner, it is inevitable that without action to address generating capacity shortfalls that non-essential consumers (including, for example, energy-intensive manufacturing) will be called upon to shed some or all of their usual load. Shortly beyond the LRC point, the negative economic impacts of such actions may be limited, but if allowed to continue over the longer term, or to worsen in frequency, duration or extent then it is likely that cumulative economic impacts will become significant. Loadshedding may also affect the extremities of the network, or generally rural and regional communities, with impacts ranging from initial inconvenience to more significant economic and social impacts in the longer term.

The adverse impacts of operating up to and beyond the LRC point are also in issue in terms of perception and in terms of future growth. Development is attracted to New South Wales based on a number of contributing factors, including the availability and security of essential services, such as electricity provision. Even if the

LRC point is not reached, but simply approached, the perception that there isn't, or will not be, sufficient secure energy supplies to continue to support development and to accommodate future development could have a very significant negative effect on further investment in the State. This is particularly relevant in the case of larger-scale, more energy-intensive industrial and manufacturing developments (noting again that demand growth forecasting has not assumed any major new industrial load). This effect is likely to remain as a perception as the State approaches the LRC point, but would become a clear reality once the LRC point is reached: development and investment potential would be significantly impacted in those areas and those sectors that rely on a secure energy supply and for which such a supply has not been provided.

In this context the Department considers it highly undesirable for the State to reach the LRC point or to move beyond it. Ideally, the State will have sufficient installed capacity at any one time to accommodate growth in demand for at least the lead time(s) necessary to implement further measures to keep pace with the growth in demand. The consequences of not doing so (and going beyond the LRC point) are considered so significant that all reasonable measures should be implemented to minimise the likelihood of those consequences becoming reality.

Diversity and Alternatives in a Robust Risk Management Framework

Consistent with rigorous risk management practice, where a consequence is considered unacceptable, the principle focus should be on minimisation of the likelihood of occurrence. There are a number of measures available to deal with the risk (likelihood) of New South Wales reaching low reserve conditions. These can be broadly grouped into those measures that reduce or limit demand (demand management measures), those that aim to improve the efficiency of existing energy consumption (energy efficiency measures) and those that provide additional generation capacity (generation capacity measures).

It may be tempting to select and elevate one of these groups of measures (demand management, energy efficiency or generation capacity), or a subset of those measures as the single, preferred solution for energy supply-demand management in New South Wales. However, a single group of measures in isolation is inadequate, and inappropriate, in the context of a comprehensive and robust risk management approach and, in some cases, insufficient to fully address the extent of the predicted supply-demand imbalance. As a consequence, the preferable and prudent approach to take is support of all three groups of measures in order to provide the greatest protection against an adverse supply-demand imbalance and to provide a balance between the benefits and constraints of each set of measures.

On the one hand, measures focused on demand management and energy efficiency have practical, social and economic limits. There is a practical extent to which energy efficiency can be improved given current technological advancement, and demand management is similarly constrained by the limits of what can be realistically achieved. There is also a limit to which society at large can and will accept constraints on energy consumption. Ultimately there will be an economic limit placed on the extent to which demand management and energy efficiency measures can be applied if economic growth is still desired. On the positive side, however, many demand management and energy efficiency measures can be pursued with minimal direct environmental or amenity impacts and without significant capital investment. Demand management and energy efficiency are therefore fundamental requirements moving forward with management of energy supply and demand in New South Wales (and more broadly across the National Electricity Market). Further, there is question as to whether demand management measures and energy efficiency schemes and programs could, on balance, support a reduction in energy consumption sufficient to offset the entire average annual growth in energy demands. While these measures may offset energy demands in the short to medium term, it is likely that in the longer term, annual growth in energy demands will outstrip demand management and energy efficiency (based on existing technology).

While demand management and efficiency measures have a major role to play, it is apparent that these approaches will not serve to entirely mitigate the risk of a supply-demand imbalance. Therefore, additional generating capacity is a real and necessary requirement to ensure a secure energy system for the State into the medium and longer term. Options available in the suite of generation capacity measures include fossil-fuelled projects, such as the development the subject of the current application, and renewable energy projects, including wind farms, solar power, geothermal facilities, hydro-electric installations and similar technologies.

Renewable energy developments are likely to play an important role in the provision of sustainable energy to address the State's demands into the future. However, and despite a number of approved and proposed wind farm projects in New South Wales, the implementation of wind energy projects (and other renewable energy proposals) is currently not being undertaken at a rate sufficient to address the predicted generation shortfalls. This circumstance may change in future, but at this time it would be imprudent to rely solely on renewable energy projects to address the energy supply-demand balance predictions. There are also existing technical constraints with connection of developments such as wind farms to the grid that need to be resolved if renewable energy project are to move from being a contributor to a majority component of the State's energy supplies.

In short, the Department considers that the most effective means of ensuring an energy generation and supply system that is effective, secure and environmentally balanced is to deliver a diverse range of energy generating options. Beyond that, market factors, consumer choices and carbon regulation will ultimately regulate generation options from the diverse suite of alternatives available. Demand management and energy efficiency measures will make an important contribution to addressing the future energy-supply demand balance, and wind farms (and other renewable energy projects) similarly have the potential to make significant contributions in this regard. However, it would be imprudent to rely solely on these measures to secure the State's energy supplies given the potentially significant consequences of reaching or passing the LRC point. It is important to have a suite of approved, environmentally acceptable energy generating developments that *could be implemented* if required in future. As highlighted by Owen, the State needs to be *prepared* to implement these options if they are needed (Owen, 2009: 575). If demand management, energy efficiency and renewable energy projects by themselves negate the need for significant additional non-renewable power generation capacity in future, it will be a positive outcome for the State. However, if these measures are relied upon solely to address the predicted energy supply-demand imbalance, the State runs a serious, unacceptable risk of deleterious outcomes in future if these measures fall short of that mark. It is in the interests of the State, and the public, to make all options available for implementation, if needed in future.

The Temporal Nature of Regulatory and Market-Based Issues

If it is accepted that a new non-renewable power generating facility is required in New South Wales in future, then two questions naturally flow in the context of the assessment of the subject and similar applications:

1. why is approval required for gas-firing and coal-firing options?
2. why is approval required for all three baseload power station projects: Mount Piper Extension, Bayswater B and the Munmorah refurbishment?

The responses to these two questions largely lies in the arguments already presented above in relation to the uncertainties associated with predicted future conditions (in this case, regulatory and market conditions) and the need to facilitate a diversity of options to manage risk. On the first point, a significant number of submissions have argued that if gas-firing and coal-firing are current viable options, then gas-firing should be approved and coal-firing excluded based on the superior environmental performance of the gas option (particularly in relation to greenhouse gas intensity). While this argument may hold some weight under existing regulatory and market conditions, it may not continue to be so into the future. In future there may be constraints in place that affect the viability of either the gas- or the coal-fired option. The most simple of these possible constraints may be availability and cost of fuel, the ability to economically source the necessary technologies, the existence of a carbon price or other market instrument that affects the viability of one technology over another, or a regulatory or policy framework that tips the balance between the technological options. In the context of risk management, it would be imprudent to exclude either fuel source option, based on a comparison of the relative impacts of the two, if both options meet acceptable environmental and amenity outcomes. To do so would be to run the risk that future conditions in fact make the approved technology unviable, with no approved alternative.

This issue also calls into question the role of the planning system, and the environmental impact process, in determining or influencing issues such as fuel source/ nature and independent market mechanisms (such as exist in the National Electricity Market). The Department is required to assess the merits of applications that come before the Minister for Planning against established standards, guidelines and policies. It is beyond the role of the New South Wales Planning system, and this assessment, to set policy relating to carbon regulation and pricing, to set policy on preferred fuels and renewable energy targets, or to establish and implement market-based instruments that would influence these matters. The Department has, however, considered the project (including both gas-fired and coal-fired options) against existing regulations, policies and standards and

considers that both fuel options are not contrary to or inconsistent with existing regulations, policies and standards set by State or Commonwealth Governments.

The second question raised in submissions focuses on the need for all three current baseload generating projects: Mount Piper Extension, Bayswater B and the Munmorah refurbishment. In broad terms, the answer again lies in the need to provide a diverse set of options for possible implementation, if required. It is important to highlight, as has been done in submissions, that all three projects will not be required in order to address the generating capacity shortfall predicted over the coming decade. However, there is no guarantee that if all three projects are approved that all three will be viable for implementation at the time they are required and that the relevant owner of the planning approval will be in a position to act on the approval at that time. The Department therefore considers it justified that all three could be approved, subject to demonstration of acceptable environmental and amenity outcomes. Ultimately it will be the electricity market, and the regulation and policies that influence its operation, that determines whether any or all of the projects are implemented and the timing of implementation. It is difficult to conceive that any of the approvals would be acted upon unless the party acting on the approval was reasonably confident that there was or would be a market to accept its supply of electricity. Such a market would either be present as a result of an identified shortfall in generating capacity to meet demand, or if the relevant party considered that its particular power station project was appropriately placed to out-compete another generator. On this latter point, submissions have also suggested that if all three baseload power projects are approved and implemented, they have the potential to displace renewable energy generators and to entrench coal-fired power generation. The Department recognises that entry of any or all of the three baseload power projects into the market has the potential, under some conditions, to displace other generators within the 'market hierarchy' – this may include renewable energy projects as well as generation from non-renewable sources. This is, however, the fundamental and necessary nature of the independent, competitive energy market. It is beyond the scope of the planning system and the Department's assessment of these projects to influence or set the direction of such an independent, competitive market. It is, however, the responsibility of Government (State and Commonwealth, as appropriate) to implement regulatory and market instruments (such as the Carbon Pollution Reduction Scheme) to give effect to Government policy on these matters, and to ensure that the 'market-hierarchy' aligns with any applicable Government policy in these areas.

Conclusion

In summary, the Department considers that the Mount Piper Extension project is justified as an important and necessary component of a broader suite of demand management, energy efficiency and capacity generating measures to secure the State's energy supplies into the future. This position is derived from considerations as follows:

1. the need to address the potential for a demand-supply imbalanced predicted to occur between 2014 and 2020;
2. the potential significant adverse consequences of not addressing this demand-supply imbalance;
3. the need to comprehensively minimise the risk (likelihood) of these potential significant adverse consequences through a diverse suite of options, including demand management, energy efficiency and generation capacity measures;
4. the importance of not pre-empting future regulatory, market and practical conditions by limiting fuel supply options at this time (subject to both fuel supply options being demonstrated as compliant with established environmental and amenity standards);
5. the risks inherent in delivering large-scale infrastructure projects, and the need to manage such risks through the provision of more than one potential option for future implementation, if required; and
6. the importance of regulation and market-based instruments in delivering Government policy outcomes in the independent, competitive energy market, rather than the NSW planning system.

3. STATUTORY CONTEXT

3.1 Major Project

The proposal is a project to which Part 3A of the *Environmental Planning and Assessment Act 1979* (the Act) applies by virtue of the opinion formed by the Director-General on 19 June 2009, as delegate for the Minister for Planning under delegation executed on 4 March 2009, that the project is a development of a kind described in Schedule 1 of *State Environmental Planning Policy (Major Development)* 2005.

3.2 Critical Infrastructure

On 26 February 2008, the then Minister for Planning declared development for the purpose of a facility for the generation of electricity which has a capacity to generate at least 250 megawatts and is the subject of an application lodged pursuant to section 75E or 75M of the Act, prior to 1 January 2013, is critical infrastructure. The subject application is a critical infrastructure project, as it has the capacity to generate up to 2000 megawatts of electricity and was lodged on 19 June 2009 under section 75M of the Act.

3.3 Concept Plan Authorisation

On 19 June 2009, the Director-General of the Department of Planning, as delegate for the Minister for Planning under delegation executed on 4 March 2009, authorised the submission of a concept plan for the proposal.

3.4 State Environmental Planning Policies

There are no State Environmental Planning Policies that apply to the proposal that substantially govern the carrying out of the development.

3.5 Director-General's Requirements and Adequacy of Environmental Assessment

The Director-General's Requirements for the preparation of an Environmental assessment for this proposal were issued on 4 July 2009. The draft Environmental Assessment submitted on 9 September 2009 was found to be adequate by the Department on 17 September 2009, pursuant to section 75H of the Act.

3.6 Exhibition of the Environmental Assessment

The Environmental Assessment was placed on public exhibition from 25 September 2009 to 26 October 2009 and submissions were invited in accordance with section 75H of the Act. The Environmental Assessment was exhibited at the following locations:

- Department of Planning's head office in Sydney;
- Nature Conservation Council of NSW;
- Lithgow City Council;
- Lithgow Library Learning Centre; and
- Portland Library.

The Environmental Assessment was also provided for download on the Department's internet site. Notification of the exhibition period was made through four separate advertisements in the *Sydney Morning Herald* (30 September 2009 and 14 October 2009), the *Daily Telegraph* (30 September 2009 and 14 October 2009), the *Orange Central Western Daily* (25 September 2009 and 10 October 2009), and the *Lithgow Mercury* (24 September 2009 and 10 October 2009). The Department has met all its legal obligations so that the Minister can make a determination on the project.

4. CONSULTATION AND ISSUES RAISED

The Department received a total number of 369 submissions, of which 357 were from the public (338 public individual submissions and 19 submissions from action groups and/or organisations) and twelve submissions were from the government.

4.1 Public Submissions

The Department received a total of 357 public submissions on the proposal in the form of letters, emails and form letters. Of the 357 public submissions, 254 objected to the proposal, 80 objected specifically to the coal option, one supported the proposal, 10 supported the gas option and 11 did not state their position.

The key issues identified in public submissions included alternatives/ justification (44%), greenhouse gas emissions and climate change (47%), water quality impacts (5%), air quality impacts (2%), noise and vibration impacts (1%) and waste (ash) management (1%).

4.2 Government Submissions

Submissions were received from 12 Government agencies (including the Hon Dr John Kaye, MLC).

The NSW Health - Sydney West Area Health Service expressed concern about the coal option whilst the Mid Western Regional Council and the City of Sydney Council strongly objected to the coal option. Both Marrickville Council and the Hon Dr Kaye MLC objected both the gas and coal options. Support for the proposal was received by Lithgow City Council.

None of the other Government agencies stated a clear position on the project (support for or opposition to the project), however the Department of Industry and Investment advised that whether the fuel source is coal or natural gas, the power station should also be carbon capture and storage ready, and would be required to be so through a condition should the project be approved. Issues raised for the Department's consideration in its assessment are summarised below.

NSW Health - Sydney West Area Health Service (SWAHS)

- Believes that the gas operated plant represents a more acceptable option in terms of human health effects as coal will likely create significantly more pollutants including sulphur dioxide, mercury, dioxins and regional ozone and could exacerbate existing health inequalities in the Mount Piper local area.
- Believes that the air quality assessment is based on a year (2001) with the lowest air pollution records, so that the actual air quality may be poorer than predicted. It is concerned that the assertion that the assessment is conservative and no adverse air quality impacts from the proposal are expected is not well founded.
- Advises that the existing short-term concentrations of sulphur dioxide exceed guideline values and that the health status of people living in the Lithgow local government area is on many measures worse than in other parts of NSW. Some nearby villages will be the most impacted by emissions from the proposal and these communities already have high levels of relative disadvantage, making them more susceptible to additional health impacts from air pollution and other environmental stressors.
- SWAHS advises that under current water supply arrangements the proposal does not appear to pose any issues in relation to health, however water availability in the Lithgow area is an ongoing issue that requires close monitoring by the relevant agencies.

Commonwealth Department of Defence

- Raises no concerns about the proposal however advises that the Civil Aviation Safety Authority needs to assess any facility with an exhaust plume with an average vertical velocity of greater than 4.3m per second for the potential hazard to aircraft operations (see CASA Advisory Circular SAC 139-05(0)).

Lithgow City Council (LCC)

- Indicates that it supports the project due to the potential economic benefits to arise from the project's construction and operation. However advises that the Proponent should address the impact of the construction workforce on housing, services, infrastructure and community facilities.
- Raised concerns about water sources and impacts from further water extraction from sources.
- Has a strong preference for coal to be transported to the site using off public road transportation with supplies coming from collieries within the Lithgow local government area. Coal sourced from outside the local government area should not result in detrimental economic, employment or social impacts to the Lithgow local government area.
- Requests that the coal powered proposal be assessed concurrently with the Ash Placement Project storage that is subject to a separate major project application.
- Request that potential ash generation be analysed for its possible use as a resource for example as construction material rather than a waste product.
- Requires that environmental impacts of emissions be adequately assessed including cumulative impacts as part of the project's justification.
- States that if the gas option is selected, it requests that the applicant investigate and implement off-takes on any new gas pipeline (or extension to an existing pipeline) for the purposes of servicing nearby villages, such as Portland.
- States that if approved, LCC would like a significant planning agreement to enhance community facilities in the Lithgow local government area regardless of the preferred fuel option.

Mid-Western Regional Council

- Objects to coal trains traversing from a new coal mine to the north west of the region across to Mount Piper, especially due to impacts in urban areas, anticipating major upheaval as the region has never experienced coal trains before.
- Believes that the Environmental Assessment fails to address the impacts of the project on the community in relation to coal trains which it believes will generate human amenity impacts and reduce the attractiveness of the area for tourism purposes and thus impact the local economy of the area.
- Believes that developments have occurred along the rail line in the belief that it would never be used to transport coal.

City of Sydney (COS)

- The COS strongly objects to the concept of a new base load coal fired power station on the basis that:
  - ⇒ national, State and local greenhouse gas emissions targets would be adversely impacted;
  - ⇒ future carbon prices mean there is a high likelihood of increase costs being passed onto consumers;
  - ⇒ continued reliance on centralised energy generation results in substantial investments required to upgrade and augment transmission and distribution networks, increasing costs to consumers;
  - ⇒ avenues for decentralised low-carbon energy generation and demand side energy management and savings should be sufficiently explored by the NSW Government as alternatives to a new base load power plant which is incompatible with low-carbon decentralised energy generation;
  - ⇒ the efficiency of existing coal fired power generation plants should be improved in preference to the construction of new plants; and
  - ⇒ the coal-fired option would result in wasted energy high emissions per energy output and unsustainable use of limited water resources.
- Advises that carbon capture and storage is not a commercially available technology, thus having a clause to allow for an undeveloped technology is invalid in purpose and unacceptable environmentally.
- Believes that the Environmental Assessment does not sufficiently explore options to reduce and/or offset greenhouse emissions.
- Advises that the stated capital investment value of the NSW Base Load Power Station is between $2,600 million to $5,000 million. Given the plant is to generate up to 2,000 megawatts, this is an approximate capital spend of $1.3 million to $2.5 million per megawatt of installed capacity, not including the substantial impact of transmission network costs. By comparison, the capital cost of one-megawatt co-generation plant is in the order of $1 million. While there are further costs associated with thermal

distribution infrastructure, these would be offset by the reduced carbon cost of gas-fired cogeneration in comparison to coal-fired electricity. Cogeneration and tri-generation has significant potential to provide electricity economically by reducing the distance between producer and consumer.

NSW Office of Water

- Requests that the Department recommend conditions which address water security contingencies during periods of drought and sustainability of water supply having regard to the water allocation under the current licence whereby Delta Electricity is bound by flow- related extraction limits under Part 9 of the *Water Act* 1912.
- Believes that the flow availability scenario presented in Section 5.2.4 of the Environmental Assessment over estimates river flow availability under drought conditions, placing additional pressure on site operational water management and potentially imposing additional pressure on the Cox's River surface water source. States that there is no commitment in the Proponent's assessment to secure additional water access entitlements in order to meet release criteria from Lake Lyell, Lake Wallace and Thompsons Creek Dam.
- Emphasises that Delta Electricity is legally obliged to meet both extraction and environmental flow release criteria. Souring additional water via the water market is the only means to increase on site water use through either purchase and trade of existing entitlements in the water market or by the upgrade of water surplus transfers from nearby mining operations. These options were not addressed in the Environmental Assessment.

Marrickville Council (MC)

- Objects to the proposed coal or gas fired power station options, based on the need to reduce greenhouse gas emissions at a strategic level. MC believes that greenhouse gas emissions will significantly increase due to the proposal and this will contradict the NSW State Plan targets for cleaner air and progress on greenhouse gas reductions.

The Hon Dr John Kaye MLC

- Opposes the coal and gas option based on environmental and economic reasons and believes there is no justification for new and costly base load generation. Furthermore, believes the project's implementation will delay transition to a low carbon economy, necessary to avoid climate change.
- Advises that once the approved plant is sold, the Government will lose the ability to direct the phase-out of fossil fuel electricity generation required to meet future emission targets.
- Advises that the failure to transition to renewable energy puts at risk thousands of long-term sustainable jobs in research and development, manufacturing, installation and operations.
- Criticises the results of the Owen Inquiry set up to examine electricity supply which was used to justify the proposal. The Owen Inquiry suggested that a shortfall of electricity would occur in the next ten years if a new baseload plant was not constructed. Dr Kaye referred to a report by NEMMCO (now AEMO) called the 'Statement of Opportunities' that identified a small shortfall in peak demand over this time and indicated that electricity needs could be met by better managing energy use and making businesses and homes more energy efficient. This is supported by the Institute for Sustainable Futures based at UTS Sydney that demonstrates that NSW could have a surplus electricity generation capacity by 2020 if renewable power is used, energy efficiency measures are implemented and small, low emission co-generation plants are built. Furthermore, the Australian Energy Market Operator's 10-year outlook confirms that NSW has no shortage of generating capacity for the next decade and no need for a massive fossil fuel generator building program.
- Dr Kaye advises that even if gas is used for Munmorah, Bayswater and Mt Piper extension, that the $C0_2$ emissions will be increased by approximately 7 per cent from existing emissions.
- Believes that the proposal should be referred to the Federal Government under the *Environment Protection and Biodiversity Conservation Act* 1999, based on the impacts on the natural environment from greenhouse gas emissions.
- Advises that a growing body of experts believe that carbon capture and geo-sequestration will not be commercially available for another 20 to 30 years. Therefore new coal or gas fired power stations should not be viewed as capable of appropriate mitigation for carbon dioxide pollution.

Department of Environment, Climate Change and Water (DECCW)

- Advises that it does not object to the proposal subject to the Proponent addressing issues raised in its submission and its recommended conditions of approval are included in the Concept Approval, should the project be approved.
- Identifies several issues in relation to air quality analysis that warrant further investigations by the Proponent and therefore had provided recommended conditions of determination to the Department.
- Acknowledges that either fuel option will represent an additional significant source of greenhouse gas emissions in NSW which represents more than a six per cent increase for the coal option and a three per cent increase for the gas option of the total NSW annual emissions respectively.
- Advises that the Proponent's noise assessment does not include a comprehensive identification or listing of noise sensitive receivers around the Mount Piper power station extension footprint.
- Advises that predicted noise levels, using Industrial Noise policy default parameters, exceed the project specific noise levels by up to 4dB(A) for the coal option and up to 5dB(A) for the gas option.
- Recommends that the cumulative noise assessment should be undertaken either by using amenity criteria considering existing and approved sources of industrial noise or cumulative noise from all industrial sources including the project can be assessed against the acceptable noise levels in Table 2.1 of the Industrial Noise Policy.
- Recommends that noise limits apply to the whole power station (the existing and proposed extension). Should the proponent wish to operate the power stations as separate entities, the noise contribution from the extension would need to be determined.
- Provides standard recommended conditions of approval that relate to water pollution.
- Notes deficiencies in the Aboriginal Cultural Heritage Assessment that should be addressed by the proponent at part of its Submissions Report and has provided recommended conditions to address the deficiencies identified in the Environmental Assessment.
- States it has reviewed the Proponent's Ecological Assessment and believes the proposed avoidance and mitigation measures are appropriate and consequently DECCW has not provided recommended conditions relevant to ecology.
- However believes that ash could have significant impacts on flora and fauna, water quality and Aboriginal cultural heritage values. Therefore ash disposal needs to be resolved prior to the determination of any project application for the coal option.

NSW Roads and Traffic Authority (RTA)

- Advises that it will not object to the proposal subject to submission of a Construction Traffic Management Plan to the RTA by the Proponent that addresses the management of construction staff traffic and measures to avoid conflicts with the operation of school buses.
- Advises that the traffic and transport assessment under section 14.3 of the Environmental Assessment does not adequately address the impacts of construction traffic generated by the proposal.
- Advises that if plans for haulage traffic change then the RTA must be given the opportunity to assess impacts of any additional road haulage.

Sydney Catchment Authority (SCA)

- Endorses the proposed conceptual wastewater and stormwater management measures for water cycle management and the construction water quality objectives stated in Table 16-1 of the Proponent's environmental management commitments.
- Based on information provided in the Environmental Assessment, the SCA considers the proposal is likely to achieve a neutral or beneficial effect on water quality and this should be made a requirement during construction and operation, where works do not adversely affect the quality of surface and ground waters beyond the boundaries of the site.
- Advises that given the existing significant extraction of water from the Cox's River by Delta Electricity for various existing activities, there may be a reduction of the sustainable median extraction from Lake Lyell in the future due to drought and climate change conditions. Therefore the SCA states that it would be concerned should any additional usage of water from the Cox's River catchment be proposed in the future.

- Advises that the assessment process should identify impacts of the project on the yield of water from the Cox's River catchment to Warragamba Dam. However, the SCA considers the project will have a minor additional impact on flows and therefore on catchment yield.
- Advises that water quality analysis should include the movement of metals to ground and surface waters and should be considered for including in any Environment Protection Licence issued for the proposal. Metals that warrant monitoring are nickel, manganese, selenium, boron, arsenic, iron, lead and copper.
- Recommends that the stormwater discharge point at Neubecks Creek immediately upstream of the Castlereagh Highway be rehabilitated and that vehicles be prevented from crossing the banks and bed of the creek. The SCA recommend that the size of the stormwater holding pond be reviewed and consideration be given to installing a baffle in the pond to steady the water and allow settlement of sediment.
- Recommends conditions to address water cycle management and water quality impacts (including cumulative impacts to water quality).

Department of Industry and Investment (DII)

- Advises that any new coal fired power station employs world's best practice low emission technology. Whether the fuel source is coal or natural gas, the power station should be carbon capture and storage ready. States that in order to ensure this occurs, the Department should require this technology as part of the project, should the project be approved.
- The DII is satisfied that the development will not result in any loss of aquatic habitat or fisheries resources however the impact of the extractive water use on aquatic habitat and threatened species such as Macquarie Perch within Cox's River should be reviewed (when the Water Management Licence is reviewed by DECCW in 2010).
- Advises that the "zero discharge" policy for wastewater is maintained due to possible contamination of discharge water into Neubecks Creek.

4.3 Submissions Report

Upon review of the submissions received, the Department required the Proponent to prepare a Response to Submissions. The Proponent provided information to address the issues raised in the submissions that were received during the public exhibition of the Environmental Assessment. As part of preparing its response to the issues raised, the Proponent undertook a review of its air quality assessment and accordingly provided updated information in the Submissions Report. The Proponent's Response to Submissions (including final Statement of Commitments) was received by the Department on 27 November 2009. The Response to Submissions was made publicly available on the Department's website.

4.4 Department's Consideration

The Department's consideration of issues raised in public and agency submissions is summarised in Table1.

Table 1: Department's Consideration of Issues Raised in Submissions

Issue	Department's Consideration
Project Justification and Benefits	See Section 2.5.
Greenhouse Gas	See section 5.1
Air Quality	See section 5.2.
Water Cycle Management	See Section 5.3.
Noise	See section 5.4
Cumulative Local Impacts	See section 5.5
Roads and Traffic	The Proponent's construction traffic assessment has focused on traffic to be generated by the proposed extension over a four and a half year period whereby a peak workforce of approximately 950 people is estimated with the peak occurring after two to three years. The assessment was based on a worst case scenario of a car occupancy rate of one. Due to the large concentrated volume of construction staff traffic, there would be an increase in the peak volume / capacity ratio on both the Castlereagh Highway and Boulder Road.

	Castlereagh Highway would have a peak volume / capacity ratio of 0.32 during normal construction periods, and 0.5 during the peak construction period. In both cases, the average speed on the Castlereagh Highway would reduce to around 80-90 km/hour. Even at this level satisfactory service would remain. Due to the significant generation of traffic to occur during construction and details such as alternate transport options and parking facilities yet to be determined, the Department has recommended a condition requiring the Proponent to provide an updated traffic assessment outlining the mitigation measures that would be incorporated as part of the final project design to minimize any traffic related impacts from the project. In relation to operational impacts, the Proponent has assumed that if the coal option is adopted, coal would be delivered via the private haulage road, by conveyor from nearby collieries or by overland conveyor from a new rail facility rather that trucked via roads. It is therefore anticipated that the main impacts on traffic will be generated by operational staff. It is estimated that an additional 50 staff will be required to operate the power station resulting in a total of 150 staff on site when considering existing staff. Staff would be both shift and day workers. The Department finds that the operational traffic volumes associated with the project would be minimal and therefore expected to be well within the capacity of the existing road local network. This is reflected in the Proponent's assessment which indicates that a Level of Service of "A" would be maintained along Boulder Road and the Castlereagh Highway. The Roads and Traffic Authority also noted in its submission, that the proposal would not generate additional haulage traffic due to usage of either the coal unloader or the existing private haul road. On this basis and in consideration of the low overall volume of traffic to be generated, the Department is satisfied that the operational traffic impacts of the project are unlikely to significantly affect the Level of Service and functioning of the roads to be used for the operation of the project. The Department understands that this would be confirmed as part of an updated traffic assessment to be submitted as part of a subsequent project application.
Aboriginal Heritage	The Proponent's assessment found no Aboriginal sites, objects or potential archaeological deposits located in study area (area comprises the land on which the proposed power station is to be developed and adjacent lands). However, the Department considers that the Proponent's methodology employed for assessing and determining the potential for impacts on items of Aboriginal cultural heritage significance did not provide for maximum (and reasonable) opportunity for the community to be consulted during the assessment, including the participation by stakeholders in the field survey of the project site. This finding is due to two reasons. Firstly, the advertisement advising registration of interest was only available for six working days, rather than ten working days, as required under the Interim Community Consultation Requirements for Applicants (DEC, 2004). Secondly, the Proponent did not invite Aboriginal representatives on the project site during the field survey, due to safety and logistic matters. Due to these reasons, the Department is of the position that further consultation with Aboriginal stakeholders is required to be undertaken by the Proponent to ensure the methodology employed has taken (or will take, through a refined methodology if necessary) the comments raised by the Registered Parties into account. As such, the Department has recommended the Proponent be required to provide an updated Heritage Assessment, undertaken in accordance with DECCW's *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* and to document the mitigation and management measures that will be incorporated as part of the final project design to minimise impacts to heritage.
Flora and Fauna	The Project is to be situated in the area previously cleared for the construction of the Mount Piper power station, when it was envisaged to comprise four rather than two units. The Department considers that the proposal would therefore require no remnant native vegetation to be cleared. The Department considers that should the Proponent implement the avoidance and mitigation measures proposed in the Environmental Assessment, the construction of the power station facility would have negligible impacts on flora and fauna. The Department however notes that should the Proponent seek project approval for the gas-fired option, the Proponent would need to assess the potential impacts to flora and fauna relevant to the proposed pipeline corridor. This would be subject to a separate assessment and approvals process.
Hazards and Risks	As required by the Director-General's Requirements (DGRs), the Environmental Assessment included an assessment of the hazards and risks of the proposed project and

	presented this in the form of a Preliminary Hazards Analysis (PHA). The PHA identified a range of accident scenarios, calculated the consequences and picked three accidents with potential for off-site consequences and went further by providing a full Quantitative Risk Assessment for the risk of these accidents. The three accident scenarios analysed further to determine the risk level were: • a natural gas pipeline release and jet fire; • gas turbine enclosure explosion; and • chlorine release from drum. As part of the Department's assessment process for this project, the Major Hazards Unit of the Department reviewed the risk and hazard assessment, prepared by the Proponent. The Major Hazards Unit found it is satisfied that the PHA satisfactory and concurs with its conclusion that the risk level expected at the boundary of the site is within the Department of Planning's risk criteria. However, the Major Hazards Unit also found that the issue of consequences from ammonia release have not been fully addressed. Section 5.6 of the PHA discusses the consequences of ammonia release by stating that concentration levels of 1000 ppm (ERPG 3) and 250 ppm (ERPG 2) were selected as concentrations of interest to determine whether there is a potential of fatality or injury at the site boundary. The analysis of the consequences concluded that 1000 ppm reached 320 meters from the tank (within the site boundary) and that, at the boundary, which is 600 metres away, the ammonia concentration is 140 ppm during day conditions and 450 ppm at night. The PHA then concludes that there is no potential for fatality risk off-site. However the Major Hazards Unit's assessment of this issue indicted that the published ERPG 3 and ERPG 2 for ammonia are 750 ppm and 150 ppm respectively, more conservative values than the ones stated by the PHA. Furthermore, the PHA did not assess the potential for off-site injury (as compared to fatality) risk at the calculated day time/night time concentrations. Since the proposal is in a remote area and the nearest agricultural residences are three kilometres away and the nearest town of Portland is four kilometres, the Major Hazards Unit found that the issue of off-site ammonia injury risk should not be reason enough to preclude the Department from approving the concept plan. The Major Hazards Unit found that this issue can be further addressed in an updated hazard analysis to be undertaken as part of a subsequent project application.

5. ASSESSMENT OF ENVIRONMENTAL IMPACTS

After consideration of the Environmental Assessment, submissions received and the Submissions Report, the Department has identified the following key environmental issues associated with the proposal:

- greenhouse gas impacts;
- air quality impacts;
- water management;
- noise impacts; and
- cumulative amenity impacts.

5.1 Greenhouse Gas Emissions

Issues

The Environmental Assessment provided an analysis of the greenhouse gases predicted to be emitted as a result of the Proposal. The Environmental Assessment included:

- prediction of total greenhouse gas emissions for construction and operation of the project;
- comparison of greenhouse gas emissions and thermal efficiency against NSW and national averages;
- consideration of best available technology;
- methods for emissions reduction and carbon offsetting; and
- the impacts of the Australian Government's *Carbon Pollution Reduction Scheme* (CPRS) on the proposal.

Generation of greenhouse gas emissions

Construction of the coal-fired power station is predicted to generate approximately 684,040 tonnes of $CO_{2\text{-}e}$ (for an estimated 5 year construction period), with the gas fired power station generating approximately 106,611 tonnes of $CO_{2\text{-}e}$ over a 3 year construction period. Operation of the coal-fired power station would generate approximately 10.8 million tonnes of $CO_{2\text{-}e}$ per year, and the gas-fired option would generate in the order of 7 million tonnes of $CO_{2\text{-}e}$ per year, both options at 80 per cent capacity. A breakdown of the predicted emissions, for both construction and operation are provided in Tables 2 and 3 below.

Table 2: Estimated Greenhouse Gas Emissions during Construction

Emissions	Activity	GHG Emissions (tonnes $CO_{2\text{-}e}$ p.a.)	
		Coal fired option	Gas fired option
Scope 3[1]	Emissions related to manufacture of steel and concrete for construction	135,144	35,106
	Emissions related to transport of construction materials (steel and concrete)	1,664	431
Total	**Scope 3 emissions construction**	**136,808**	**35,537**

Table 3: Estimated Greenhouse Gas Emissions from Operation

Emissions	Activity	GHG Emissions (tonnes $CO_{2\text{-}e}$ p.a.)	
		Coal fired option	Gas fired option
Scope 1[1]	Combustion of fuel during operations	10,470,000	4,910,000
Scope 2[1]	Emissions from purchased electricity	negligible	negligible
Scope 3	Fugitive emissions from fuel extraction	256,500	-
	Emissions from transporting fuel to site (coal via rail from Cobbora to Mt Piper or gas via pipeline)	55,601	2,088,100
Total	**Scope 1, 2 and 3 emissions operations**	**10,782,101**	**6,998,100**

1 Scope 1 emissions include direct or point-source emissions controlled by the company, for example, on-site stationary combustion of gas or coal for electricity generation. Scope 2 emissions account for indirect emissions from the generation of electricity that is purchased and consumed by the organisation (negligible in this case as the Mt Piper Extension would use electricity generated on site, rather than purchased from another generator) and Scope 3 emissions include all other indirect emissions, including those that are a consequence of the activities of the Proponent, but occur from sources not owned or controlled by them.

Comparison against NSW and national averages

The Proponent provided an indication of the predicted greenhouse gas emissions intensity and thermal efficiency of the project against current NSW averages. The predicted greenhouse gas emissions intensity for the proposed Mount Piper power station extension is about 0.838 tonnes $CO_{2\text{-}e}$/MWh for the coal-fired option and 0.358 tonnes $CO_{2\text{-}e}$/MWh for the gas-fired option. The Proponent compared these emission intensities against the NSW Pool Coefficient, which represents the emissions of greenhouse gases (in tonnes of carbon dioxide equivalent) per MWh of electricity supplied from the 'pool' of major power stations serving the NSW electricity grid. For 2009, the NSW Pool Coefficient is 0.967 tonnes $CO_{2\text{-}e}$/MWh (greenhouse gas emission intensity). The Proponent has noted that both the coal- and gas-fired options of the Mount Piper extension will have greenhouse gas emissions intensities lower than the current NSW Pool Coefficient.

The Proponent also compared the greenhouse gas emissions from fuel combustion against national emissions for the total energy sector as well as stationary sources (401 million tonnes $CO_{2e,}$ and 287 million tonnes $CO_{2\text{-}e}$ respectively in 2006). The assessment found that the coal fired option equates to less than 4 per cent against both these sectors/sources while the gas-fired option is less than 2 per cent.

Thermal efficiency and best achievable technology

The Proponent predicts the Mount Piper extension, using dry (or air) cooling technology, would have a thermal efficiency of approximately 39.2 per cent for the coal-fired option and provides a range of options of plant configurations for the gas fired option, noting that thermal efficiency would typically be between 50 – 55 per cent for a similar gas-fired plant. The Environmental Assessment compared the proposed Mount Piper power station extension against the Australian Generator Efficiency Standards, which specify best available technology for power plant efficiency and greenhouse intensity for new plant. The Environmental Assessment stated that while the Generator Efficiency Standards identify slightly better outputs (thermal efficiency of 39.7 per cent compared to Mt Piper's predicted 39.2 per cent and greenhouse gas emissions of 820kg/MWh compared to Mount Piper's predicted 834kg/MWh), the comparison is not equivalent as the Standards are based on performance at 25^{o}C and an altitude of 111m while the annual average ambient temperature for Mount Piper is approximately 13^{o}C, and the altitude is 940m. The Proponent notes that this variation equates to an efficiency differential of the order of 0.1 per cent, and argues that the proposed Mount Piper extension is therefore considered to be best commercial available technology.

For the gas-fired option, the Environmental Assessment identified a thermal efficiency range of 50-55 per cent depending on plant, however an actual estimate of 51.8 per cent was provided in another section of the document. The Environmental Assessment suggests that best practice would be the use of a H class plant with cold water direct cooling. H class machines use steam, as well as operating with higher cycle (firing) temperatures compared to other classes of plant. High thermal efficiencies are optimised with low air and cooling water temperatures. However, as stated above, wet cooling is not an option for this project. The Proponent has therefore argued that the efficiency benefits of the H class technology would be marginal (i.e. the marginal net gain would not justify the additional expenditure), and therefore proposes to use F class technology if the gas option is selected.

Greenhouse Gas Management

The Environmental Assessment identified a number of options for the management of greenhouse gas emissions through reductions or offsets including sequestration through carbon sinks, carbon credit trading, geo-sequestration and renewable energy production. The Proponent has noted that at this stage, none of the options are technically or commercially feasible, however notes that it is expected that the cost of post combustion capture technology (a carbon capture and storage (CCS) technology) is expected to decrease markedly as the technology becomes more widely deployed at large scale. The Proponent has therefore proposed to prepare the power station to be capable of accepting CCS technology when it is commercially feasible, including identifying provision of space to accommodate the additional steam ducting, plant control system and auxiliary plant electrical distribution system, as well as sufficient space and access for the additional facilities that would be required.

The Environmental Assessment included an evaluation of the cost of CCS at different stages of development (from initial demonstration projects, to early commercial and eventually mature commercial projects) as follows:

- early full commercial scale CCS projects (900MW) starting from 2020 were estimated to cost around $60 - 85 per tonne CO_2; and
- mature commercial CCS projects starting from 2030 (assuming 80-120 projects beforehand) estimated the cost of CCS at approximately $50 – 75 per tonne CO_2.

The Environmental Assessment noted that the cost would depend on various factors including technology development and economies of scale, and that the cost of retrofitting an existing power plant would likely be higher than these figures, and dependent on site specific characteristics (plant specifications, remaining economic life and site layout, etc).

The Environmental Assessment stated that the trigger point for the implementation of CCS will be when the technology is proven and the cost of implementing CCS reduces to less than the cost of carbon emissions under an operating carbon/emissions trading scheme.

Implications of the Carbon Pollution Reduction Scheme

The Environmental Assessment identified that carbon prices associated with the introduction of the CPRS are initially expected to be around $25 per tonne, and that a price cap of $40 per tonne will be enforced for the first 5 years of the scheme, increasing by 5 per cent per year. Estimates were provided on the costs of the CPRS on production for three cost scenarios, identified in Table 4.

Table 4: Cost of CPRS on production in MWh sent out

CPRS	Coal fired power station	Gas fired power station
CPRS $10 per tonne CO_2	$8.10/MWH	$3.60/MWH
CPRS $25 per tonne CO_2	$20.30/MWH	$9.00/MWH
CPRS $50 per tonne CO_2	$40.60/MWH	$17.90/MWH

The Proponent noted that the costs of CCS are significantly higher than the costs of the CPRS figures identified in Table 4, estimating that in 2020, the costs per MWH will be in the order of $50-70 for the coal-fired option and $26-37 for the gas-fired option. The Environmental Assessment concluded that CCS is not currently commercially viable, and is not likely to be until a CPRS cost of about $50 per tonne CO_2. Notwithstanding this, the Environmental Assessment states that the Mount Piper coal-fired option would be built as CCS ready to facilitate future retrofit, however that the cost to retrofit CCS for natural gas will be significantly higher and is not likely to be economic at any stage of the project.

Submissions

A total of 329 submissions (89 percent) received on the project raised increasing greenhouse gas emissions and associated climate change impacts from the operation of the power station as issues of significant concern. A total of 302 submissions (81 percent) indicated that the focus should be on renewable or alternative forms of energy generation. The issue of renewable or alternative forms of energy generation are discussed in Section 2.4 of this Report. The comments made in relation to greenhouse gas and climate change are summarised as follows:

- objection to the development of any new fossil fuel power stations in NSW, particularly new coal-fired power stations;
- noting that the proposal will significantly increase national, state and local greenhouse gas emissions and that the additional generation of greenhouse gas emissions is unacceptable, with various submissions including estimates of increases to NSW emissions by between 10 and 50 per cent, depending on whether one or both proposals (i.e. Mt Piper) are pursued;
- stating that it is unacceptable to be increasing emissions in the context of rapid global warming and the findings of the International Panel on Climate Change that global emissions should be reduced by 60-80 per cent immediately;
- suggesting that the proposal should be rejected in light of the Australian and NSW government's attempts to reduce emissions, and reference was made to the NSW State Plan targets for progress on greenhouse gas reductions to a return to 2000 greenhouse gas emission levels by 2015 and a 60 per cent reduction in greenhouse gas emissions by 2050;

- discussion that modern generators are slightly more efficient than older generators, however, that this is irrelevant if the emissions are additional to current emissions, also noting that coal-fired power stations in NSW are currently operating at 65 per cent capacity, that coal technology wastes energy, with high emissions per energy output;
- identified that carbon capture and storage is a long way from being a feasible and deployable option; and
- noted that increased costs will be passed onto consumers, including through an Emissions Trading Scheme.

Agency submissions (such as Department of Environment, Climate Change and Water and the Department of Industry and Investment) noted the proposal would result in significant increases to NSW greenhouse gas emissions, and emphasised the need to continue to evaluate the availability and feasibility of emissions reduction and offset measures. City of Sydney and Marrickville Councils objected to the proposal in relation to the impact to national, state and local greenhouse gas emission targets, associated increased costs for consumers, and stated preference for demand management and alternative energy generation measures.

Consideration

The Department recognises that the issue of greenhouse gas emissions is both complex and contentious, and that it would be preferable to provide electricity with no additional greenhouse gas emissions. Section 2.5 discusses the need for additional baseload electricity.

Independent review

The Department commissioned Arup Pty Ltd (Arup) to undertake an independent peer review of the Proponent's greenhouse gas assessment. Arup considered that the estimates of greenhouse gas emissions for both construction and operation of the proposal were a significant underestimate. However, Arup noted that accuracy in the construction estimates is less imperative as it is a one-off occurrence, compared with the emissions related to the ongoing operation of a power station (approximately 30 years). Arup estimated that operation of the proposed Mount Piper power station extension would be about 13.1 million tonnes $CO_{2\text{-}e}$ per annum for coal (compared to the Proponent's estimate of 10.8 million tonnes $CO_{2\text{-}e}$ per annum) and approximately 7.2 million tonnes $CO_{2\text{-}e}$ per annum (compared to the Proponent's estimate of 7.0 million tonnes $CO_{2\text{-}e}$ per annum) for the gas-fired option. Notwithstanding the differences in the estimates provided, Arup noted that it is likely actual emissions would fall somewhere between the Proponent's and Arup's predictions. Arup suggested the difference in the figures is due to the Proponent using an 80 per cent capacity factor, which they considered reasonable for typical operations, but not representative of a worst case scenario (theoretical maximum capacity). Furthermore, the review noted that it had become industry standard to report only Scope 1 and 2 emissions as these comprise the most significant emissions, and it is difficult to determine with certainty that Scope 3 emissions would not occur even without the Project.

In terms of best achievable practice, Arup suggests that there is insufficient information to determine whether the reported thermal efficiency for the coal-fired option (39.2 per cent) is the best achievable practice for emissions intensity and thermal efficiency. The review notes that the Environmental Assessment undertaken for the proposed Bayswater B coal-fired power station identifies a technology (theoretical high efficiency thermal design) which could increase the thermal efficiency from 39.5 per cent to 40.2 per cent. However, Arup does not find that the reported steam conditions for the boiler technology are comparable with similar commercial plants world wide, and as such, the thermal efficiency for the proposed Mount Piper extension is likely to be comparable with these plants. For the gas-fired option, Arup notes that the Environmental Assessment does not commit to any one gas technology, however that the 9FB gas turbine used in the analysis is not the best achievable practice for emissions intensity and thermal efficiency in gas fired generation, and suggests that a H class plant is achievable and has higher thermal efficiency and lower emissions intensity.

In relation to emissions intensity of the proposal, Arup notes:

- the values identified in the Environmental Assessment may be underestimated (as they are based on a theoretical maximum capacity rather than allowing for typical operation which would include start up/shut down and maintenance periods which would increase emissions intensity); and
- use of the NSW pool co-efficient is not an acceptable representation of current NSW average emissions intensity for comparative purposes, as the "pool" only considers existing steam/coal and one gas power

station, and thirteen hydro-electric plants operating in 2003, and is not based on all electricity generated in NSW (e.g. other gas, wind farms, biomass or cogeneration plants, etc).

Furthermore, while the assessment compares the predicted emissions intensity of the options against the NSW Pool Coefficient for 2009 (currently estimated at 0.967 tonnes $CO_{2\text{-}e}$ per MWh sent out) and shows that both the coal- and gas-fired options for the Mount Piper extensions are below this figure, Arup suggests that by the time the power station is built the coal-fired option would have an emissions intensity greater than the average NSW emissions intensity, due to government policy encouraging more renewable generators into the market which would reduce the emissions intensity of the average in time. It should be noted, however, that Arup recognises that the gas-fired option is likely to have an emissions intensity significantly lower than the average NSW emissions intensity, both at current levels and into the foreseeable future.

Similarly, with regard to the predictions against the national emissions, Arup noted that the assessment does not consider the impact of a CPRS when calculating the percentage of emissions against the national total. Arup suggests that with the CPRS, total national emissions will be reduced over time because of a price on greenhouse gas emissions, and as such, both the coal- and gas-fired options will emit a significantly larger proportion of national emissions than estimated by the Proponent. Arup emphasises that the Project therefore represents a significant net increase in overall emissions and estimates that in a mid-range CPRS scenario (CPRS 15), greenhouse gas emissions from the Proposal would represent approximately 2.9 per cent for the coal-fired option and 1.6 per cent for the gas-fired option of national emissions over the life time of the Project.

In relation to emissions offsetting, Arup suggested that renewable energy augmentation measures such as solar or biomass co-firing have not been appropriately considered and are likely to be feasible by the commencement and/or throughout the life of the project, particularly if the CPRS is implemented. Arup notes that while the Environmental Assessment includes nomination of carbon capture technology (post-combustion carbon capture and storage), should the plant be designed to be carbon capture ready, based on pre-nomination of a preferred technology, this may then prohibit the selection of alternative technologies which may become more advanced and cost effective over time. Arup also questioned the retrofit cost calculations and potential year of a retrofit, influencing the cost predictions. Furthermore, Arup queried why the Environmental Assessment did not include evaluation of the project with and without mitigation measures when considering the costs of the CPRS. Arup undertook a brief analysis and suggested that a coal carbon price of less than $25 per tonne could result in gas becoming a more viable technology, and that solar augmentation may be preferable over CCS technology.

The Proponent has provided the Department with a response to the independent review. In response to Arup's comments regarding the quantity of operational greenhouse gas emissions, the Proponent justified using an 80% capacity factor and stated that using a 100% capacity factor is unreasonable for planning purposes, the reasons being, maximum capacity does not allow for outages (eg for maintenance and upgrades), nor the need for the plant to operate within the competitive National Electricity Market which will have an emissions trading scheme in place that will affect supply, demand and therefore the power stations dispatch.

In relation to the Arup's suggestion that the coal-fired option will have a higher emissions intensity than the NSW average in 2015, the Proponent undertook additional calculations based on new and planned generation and suggested that while the NSW average in 2015 would be lower than the 2007 and 2009 figures, reiterated that the proposal would still be slightly lower than the estimated average (i.e. estimated at 0.84 tonnes $CO_{2\text{-}e}$ per MWh versus 0.838 tonnes $CO_{2\text{-}e}$ per MWh for the coal-fired option). In relation to the national figures and considering the CPRS, the Proponent noted the calculations undertaken by Arup (for the mid range scenario of CPRS 15), however also included calculations based on the CPRS Reference and CPRS 5 scenarios which showed the effect on emissions would range from 1.24-2.55 per cent for coal and 0.68-1.4 per cent for gas. Furthermore, the Proponent noted that the CPRS is intended to provide the most economically efficient method for achieving greenhouse gas reduction targets.

The Proponent disagreed with Arup's view that the best achievable practice was not identified for either the coal- or gas-fired options and noted that use of both ultra-supercritical coal and combined cycle gas turbine technology is considered best commercially available technology, as indicated in the Owen Report. In relation to the use of theoretical high efficiency thermal design for the coal-fired option the Proponent suggested that a sent out efficiency of 40.16% (compared to 39.2% identified) could be achieved, however that this would require significant additional cost due to additional air cooled condensers. In this regard, the Proponent noted that the

impact on cost could not be justified in the competitive National Electricity Market for the marginal improvements in thermal efficiency and greenhouse gas intensity, and is therefore not commercially viable. In relation to the gas-fired option the Proponent suggested that there are little differences in performance between the H and F class plants, particularly when using dry cooling technology and at the elevated location of Mount Piper and the F class machines currently incorporate many features of the H class plant. Furthermore, the Proponents noted that H class are still in development (which impacts price), and that a conservative approach was adopted for this concept plan stage, and the final plant configuration will be determined by the Proponent submitting the project application.

In relation to measures to reduce and or offset emissions, the Proponent noted that solar augmentation is not currently viable for the Mount Piper extension project as it is not commercially viable (high capital cost), has not previously been used on an ultra super critical plant, and there is minimal land area available for a solar array, particularly after allowance is made for a carbon capture plant. Finally, the Proponent stated that its Environmental Assessment was sound in relation to the CCS and CPRS calculations and methodologies used.

Departments Consideration

The Department has reviewed the Environmental Assessment, the independent review of the greenhouse gas assessment and the Proponent's response to the independent review, as well as the submissions received on this issue. The Department considers that the assessment undertaken is sufficient to provide an indication of the likely greenhouse gas emissions resulting from the proposal. It is noted, however, that additional detail will be required as part of a project application to confirm these impacts, and the Department has recommended conditions of approval to this effect.

As outlined in section 2.5 of this report, renewable energy sources, energy efficiency and demand management, while being important measures for reducing energy demands and total greenhouse gas emissions, do not by themselves represent a sufficiently robust approach to addressing the risk of an energy supply-demand imbalance in future. These measures may well expand in future to provide a greater contribution towards addressing these matters, it would be imprudent to assume they will develop rapidly enough to fully resolve predicted shortfalls in energy generating capacity over the coming decade. As a consequence, there is a real need to be prepared for implementation of a fossil-fuelled power generating facility if and when it is required.

In this context, it is not possible to fully remove greenhouse gas emissions from the solution to the predicted supply-demand imbalance. There will be greenhouse gas emissions associated with this solution, regardless of whether a gas-fired or a coal-fired facility is built. Further, and as outlined section 2.5 of this report, it would be imprudent to select a fuel at this time (and, arguably, not the role of the planning system to do so) given that the economic and commercial situation at the time of needing additional baseload capacity may be different from current conditions, and such that one or the other fuel is not viable at that time. It is the role of separate Government policy, regulation and relevant market instruments to influence the economic and commercial conditions that would drive energy generation towards or away from coal or gas fuel. By approving both gas- and coal-fired options, the planning system not only delivers approvals that sufficiently deal with the risk of an energy-generation shortfall (including risks associated with the delivery of a fuel-specific project), but it also leaves open the appropriate role of Government policy, regulation and market instruments to influence the direction of new energy generation.

The Department considers, therefore, that the question to be addressed as part of this assessment is not whether coal-fired or gas-fired options are preferable (to the alternative fuel option) based on a comparison of the total predicted greenhouse gas emissions from each (or for that matter, a comparison of the greenhouse gas intensity of the two fuel options). Rather, it is to consider whether each fuel option, in isolation from the other, represents the most efficient and least greenhouse gas intensive configuration for that particular fuel. That is – whether the Proponent has presented the most greenhouse efficient coal option currently commercially available, and the most greenhouse gas efficient coal option currently commercially available. The Department is satisfied that the Proponent has done so, on both counts, taking into account the commercial availability of technologies and local conditions (including meteorology and cooling water available, for example). The relevant components of this position are outlined further below.

Generation of greenhouse gas emissions

Operation of the proposal is predicted to generate in the vicinity of 10.8 and 13.1 million tonnes $CO_{2\text{-}e}$ per year from the coal-fired option, and 7 and 7.2 million tonnes $CO_{2\text{-}e}$ per year with the gas-fired option. Although Arup and the Proponent do not agree on the figures provided, the Department concurs with Arup that it is likely the proposal will fall somewhere between the estimates from both parties. As such, the Department has recommended a condition of concept approval which requires the Proponent to undertake further refinement and confirmation of the predicted emissions (for Scope 1, 2 and 3) to be generated by the proposal, at the project application stage, and associated with design and selection of the preferred fuel source, delivery and technology.

As noted in the submissions received, the total annual production of greenhouse gases generated from the proposal will increase both the NSW and Australian greenhouse gas emissions, with either fuel source selected. While this increase in total greenhouse gas emissions would be driven by energy demands, to appropriately consider the potential greenhouse gas impacts of the proposal, it is first important to contextualise the potential impact within recent NSW and Australian performance.

Comparison of greenhouse gas emissions against NSW and national averages

In 2007, it was estimated that total greenhouse gas emissions in Australia, as carbon dioxide equivalents, were 597.2 million tonnes, up by 9.3 per cent from 1990 levels (Commonwealth of Australia, 2009). The major contributor to this increase came from the stationary energy sector, which alone grew in emissions by 49.5 per cent to 291.7 million tonnes CO_2-e. Recorded total greenhouse gas emissions in New South Wales have generally remained stable during the period 1990 to 2007, slightly increasing from 160.7 million tonnes in 1990 to 162.7 million tonnes in 2007 (Commonwealth of Australia and DECCW, 2009). Reduced emissions in other sectors have offset a recorded increase in emissions from the New South Wales stationary energy sector from 59.9 million tonnes of CO_2-e in 1990 to 79.4 million tonnes in 2007 (approximately 33 per cent increase).

In the context of 2007 greenhouse gas emissions, the Department has calculated the percentage impact of the proposal, without any mitigation or offsets, would:

- increase total New South Wales emissions by approximately 6.6-8.1 per cent for the coal fired option and 4.3-4.4 per cent for the gas fired option; and
- increase total Australian emissions by approximately 1.8-2.2 per cent for the coal fired option and 1.2 per cent for the gas fired option (Macquarie Generation and Commonwealth of Australia, 2009).

Whilst these figures appear significant, particularly in the context of attempts to reduce emissions, it is important to note that the above figures are conservative as the calculations are based on reported/ recorded greenhouse gas emissions at State and national levels. Although these emission inventories are good estimates, they are at best estimates and in some cases may not account for all emission sources. They may well then represent an underestimate of inventories of emissions within a particular region at a particular time, and as a result, overestimate the percentage increases that would be attributable to the proposed power station. In addition, the calculations do not take into account any energy conservation/ efficiency measures or CCS that may be applied to the plant, nor any offset developments to reduce net greenhouse gas impacts.

In relation to comparison of emissions intensity against the New South Wales average, the Department considers that the estimates provided by the Proponent (between 0.813- 0.838 tonnes $CO_{2\text{-}e}$ /MWH for coal and 0.358 tonnes $CO_{2\text{-}e}$ /MWH for gas) are satisfactory for this stage of the project. The greenhouse gas intensity of each power station varies from year to year depending on the quality of coal burned, the mix of other fuels and the overall operating efficiency. In relation to the impacts of the project on the electricity market, and in particular, the NSW Pool Coefficient, the Proponent has argued potentially significant benefits from the project 'displacing' other less-efficient generators with a resultant drop in the Coefficient. While this may be the case, depending on market conditions and the status of other existing and proposed generators, the Department considers that the net effect on the Pool Coefficient is likely to be small, if reduced at all. Furthermore, the Department concurs with Arup's suggestion that by the time the power station is built, if the coal-fired option is ultimately selected, the proposal is likely to have an emissions intensity greater than the average NSW emissions intensity (as distinct from the NSW Pool Coefficient). While the Department notes the calculations undertaken by the Proponent in relation to estimating the NSW average in 2015, the Department considers that the figure may be high, as it appears not to have included all the likely generation that is currently being commissioned/ constructed or is committed, which may bring down the average. Notwithstanding this, the

Department also considers that at the time the power station is built, the CPRS is likely to be in effect, and other factors (such as those discussed in Section 2.4) will play the key determining role in the ultimate selection of fuel, plant and emissions intensity gained.

With regards to the estimates against national greenhouse gas emissions, the Department notes that under either scenario (the Proponent's or Arup's), and considering any of the CPRS scenarios identified, the result is additional greenhouse gas emissions, ranging from approximately 2.08-3.4 per cent of the national average for the coal-fired option and 0.68-1.6 per cent of the national average for the gas-fired option. The Department notes however, that these figures do not consider the upper range scenarios of the CPRS (e.g. CPRS 25). The Department acknowledges that the Australian and NSW Governments have made a commitment to reducing Australia's GHG emissions by 60 per cent by 2050 on 2000 levels, however, recognises that at this stage, it is unclear whether the CPRS interim targets will be set at a five per cent or 25 per cent reduction (or somewhere in-between) on 2000 levels by 2020. As such, it is difficult to quantify the effect of the CPRS and therefore, to accurately calculate the effect of the power station on national emissions, except to note that the proposal *will* increase national greenhouse gas emissions by some amount. While, Arup noted that the power stations are going to make reducing national greenhouse gas emissions more difficult, and will likely increase the costs passed on to the wider community, as correctly noted by the Proponent, the proposed power station will be required to operate commercially within the competitive CPRS market, which will encourage generators to maximise their efficiencies. Again, such a consideration at this stage of the CPRS is beyond the role of the Department, and is for the market to determine. Notwithstanding this uncertainty, the quantum of greenhouse gas increase represents the inevitable cost of meeting consumer energy demand in the case that market forces (influenced by consumer choice and regulation) retain the viability of fossil-fuel generators compared to alternatives.

Consideration of best available technology

With respect to technology selection, the Department recognises that the Arup review has raised some questions on whether or not the Proponent has selected the best available technology for each option. At this concept plan application stage, this specifically relates to:

- whether theoretical high efficiency thermal design could be used for the coal fired option; and
- whether the Proponent is justified in selecting the F class technology over the more efficient H class technology for the gas fired option.

While the Proponent argued that the current proposal achieves the desired outcome, and is the best available commercially feasible technology, the Department has suggested a condition of approval which seeks further rationale for the technology selected by the project application stage.

Emissions reduction and carbon offsetting

The Department concurs with DECCW and Arup that the Proponent has undertaken a detailed review of the available emissions reduction options and that currently, post-combustion carbon capture appears to be the most suitable technology, noting that a trial of this technology is currently being undertaken at the Munmorah power station. However, the Department also concurs with Arup that emissions offsetting measures (such as renewable energy augmentation for example, solar augmentation which is currently used at Liddell) may become more commercially viable over time, and may also be preferable to implementing CCS options. In this regard, the Department notes the Proponent's commitment to undertake an annual review of the options available for emissions reduction, offsetting and other technologies, however that the ultimate selection will depend on market factors at play at the time of project selection.

With regard to the Proponent's commitment to designing the coal-fired power station to be 'carbon capture ready', the Department is wary of pre-determining a technology which may become superseded by advancements that may occur by the time of the next planning and design phase. As such, the Department has suggested a condition of approval to allow for the flexibility of the offset measures which are to be implemented at the time of the next application stage.

In regards to the different cost implications of the CPRS versus the CCS, the Department does not consider that this is a matter that can be resolved until the next stage of the approvals process, due to the uncertainties with the market and the regulatory changes, and as such, has recommended a condition of concept approval which requires the provision of additional information as part of the project application. The Department considers that

market forces will ultimately drive the level of generation of the power station and its fuel source such that it would be unnecessary to place restrictions on the measures proposed to reduce or offset the emissions at this stage. Furthermore, the Department notes that the project as with other generators in the NSW energy sector would be subject to regulation by the CPRS, when it comes into effect in the future. The CPRS would provide a market based mechanism for regulating greenhouse gas generators, setting a level playing field for all generators through standard carbon pricing which would in affect result in less carbon efficient generators being out-competed by those with greater carbon efficiencies. The Department considers that the CPRS and other state and national greenhouse gas/ climate change policies are likely to play a significant role in both the fuel selection process for the project, and the need for proposals to be as efficient as possible. As discussed in Section 2.4, the CPRS has the potential to affect electricity prices, and demand for electricity, but the extent to which this effect presents itself will depend on the timing of the CPRS and, more significantly, the net carbon reduction outcome targeted by the Scheme.

In their report, Arup noted that the Commonwealth's EPBC Act is currently under review, and if greenhouse gas emissions are included as one of the matters of national environmental significance (NES), the proposal would likely have a significant impact under the Act. The Department notes that a referral has been submitted to the Commonwealth Department of Environment, Heritage and the Arts (DEWHA), however that greenhouse gas emissions are not currently a matter of NES. Furthermore, in the event that greenhouse gas emissions are included as a matter of NES, it would be the Proponent's responsibility to submit a revised referral to DEWHA, who would then determine the appropriate course of action (designation as a controlled action, additional assessment, etc). It is not within the scope of this Department's mandate to attempt to predetermine the outcome of the EPBC review nor regulate under the EPBC Act.

Many of the submissions raised the issue of the link between increased greenhouse gas emissions leading to increased climate change impacts. The Department does not disagree with these submissions. However, the Department considers it's role is to assess the proposal based on best available technology and project need, considering the environmental, social and economic impacts of the proposal. The Department considers that there may be other opportunities to offset the greenhouse gas emissions generated by the proposal, and that it is not in the public interest to allow a situation to eventuate when the demand for electricity outweighs the supply, which would also have inherent economic and social impacts. In NSW, approximately 90 per cent of electricity generated is sourced from black coal, and greenhouse gas emissions from the electricity sector represent around one-third of the state's emissions (Department Infrastructure and Investment, 2009). However, as noted in the NSW State Plan (2009), the Government is developing and implementing a detailed *Climate Change Action Plan* and *Clean Energy Strategy* which includes measures such as supporting distributed co- and tri-generation energy in offices, industry, shopping centres and apartment blocks, supporting natural gas supply and pipeline projects across NSW, and investing $100 million to support development of carbon capture and storage technology to reduce emissions from coal-fired power generation.

Conclusion

While renewable generation, demand management and energy efficiency measures are currently being pursued in the market, as noted in Section 2.5, there remains a risk that these options by themselves will not be sufficient to address growing power demands and the need to secure the State's energy future.

Furthermore, despite the fact that the Minister has approved more than 1,000 megawatts of wind farms over the last few years, only a small number of the wind farms are currently operational, or in the process of construction. Given this experience, it is clear that although renewable energy proposals are being approved, there is a lag in their implementation. Notwithstanding this, with the NSW and Australian Government's targets of 20 per cent renewable energy consumption by 2020, additional wind and other alternative/renewable energy generation proposals are being submitted and are currently in various stages of assessment with the Department. However, while the market is pursuing this generation, it is unlikely that enough alternative energy generation will be implemented in the short to medium term at a sufficient rate to address demand growth.

The reality is that baseload (coal- and or gas-fired) generation is likely to remain a necessity in the medium to short term in this context. It is prudent therefore, that opportunities are examined to address this potentially medium term risk. In doing so, there is also opportunity to investigate and implement performance and efficiency improvements to ensure that any fossil fuel-fired proposal reflects best practice. The current project applies this prudent approach to managing risk in the context of baseload generating capacity. While there will

be an increase in the total greenhouse gas emissions in NSW from either facility, the impact of these emissions must be balanced against the risks associated with a generating shortfall and the significant social and economic implications to the State should such a situation eventuate. On balance, therefore, the Department has recommended for this stage of concept approval, a number of conditions which require the Proponent to clearly demonstrate that best practice technology is to be implemented to minimise greenhouse gas emissions, and to demonstrate that they are investigating carbon reduction technologies that could be feasibly retrofitted to the plant, as well as other emission reduction or offset measures, to reduce or offset greenhouse gas emissions.

5.2 Air Quality and Health Impacts

Issue

The Proponent conducted an air quality assessment which followed the guideline *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (DECC 2005). The Proponent used a computer-based dispersion model to predict ground-level pollutant concentrations which may result from the identified emission sources, and compared the modelled predictions with relevant air quality criteria to assess the effect the proposal would have on the existing air quality environment.

The main air pollutants to be produced by the Project under the coal option would be oxides of nitrogen, sulphur dioxide, carbon monoxide, total suspended particulates, and particulate matter of a diameter less than or equal to 10 microns. The other air pollutants to be produced are fluoride, antimony, arsenic, beryllium, cadmium, chromium III, chromium IV, lead, mercury (inorganic), nickel, dioxins and furans, and polycyclic aromatic hydrocarbons (PAH) as benzo[a]pyrene. The main air pollutants to be produced by the project under the gas option would be oxides of nitrogen and carbon monoxide.

The Proponent characterised the existing environment of the Project area for the purposes of the air quality assessment by the prevailing meteorology and the existing air quality. The Proponent incorporated weather information in the assessment by using data from the monitoring station at Mt Piper Power Station and extrapolating these data to other areas using a wind-field model. The CALPUFF dispersion model, which takes into account the effects of local topography and changes in land surface characteristics, was used to determine the meteorological conditions that would exist in the project area. The data from the monitoring station at Mt Piper Power Station recorded in the year 2001 was used for the development of the meteorological wind field (data was also available for the years 2002 to 2005), as 100 per cent of the recordings were recovered (8760 hourly records) and the mean wind speed (2.5 m/s) and percentage of calms (4.9 per cent) was considered to be the general pattern recorded in the following years by the Proponent. For existing air quality, data recorded in the year 2001 from the existing air quality monitoring locations situated at Blackmans Flat and Wallerawang was used to provide consistency with the modelled year of meteorology. These air quality monitoring stations record hourly averages of total NO_x, NO_2, NO and SO_2.

The Proponent derived the potential pollutant concentration levels from the dispersion modelling conducted. The modelled results were compared with the relevant air quality criteria. The *Protection of the Environment Operations (Clean Air) Regulation 2002* sets the maximum limits on emissions from activities and plant for solid particles, nitrogen dioxide or nitric oxide or both as nitrogen dioxide equivalent, fluorine and other substances. In addition to these standards, the then Environment Protection Authority has placed licence conditions on emission points at the existing power station. The concentrations of the listed substances have been considered as target maximum levels for the Project by the Proponent. With regards to ambient air quality criteria, the Department of Environment, Climate Change and Water is the regulatory authority. It sets out the air quality criteria, which is generally set for the protection of human health.

Table 5: Summary of Dispersion Modelling Results

Note: shaded coloured areas represent pollutant levels that exceed the nominated criteria. The numbers shown in brackets represent the predicted maximum number of hours that a pollutant would be above the criterion per year.

	Individual Contributions (µg/m³)		Cumulative Scenarios (µg/m³)				
	New Coal	New Gas	Mt Piper + Wallerawang	Mt Piper + New Coal	Mt Piper + New Gas	Mt Piper + Wallerawang + New Coal	Mt Piper + Wallerawang + New Gas
1 hour average NOx (No Criterion)							
Maximum	660	334	919	1128	830	1218	919
Maximum at Blackmans Flat	51	162	167	178	162	189	173
Maximum at Wallerawang	62	117	881	132	117	881	881
1 hour average NO_2 (Criterion: 246 µg/m³)							
Maximum	198 (0)	100 (0)	276 (1)	338 (2)	249 (1)	365 (2)	276 (1)
Maximum at Blackmans Flat	15	49	50	53	49	57	52
Maximum at Wallerawang	19	35	264	40	35	264	264
Annual Average NO_x (Criterion: 62 µg/m³)							
Maximum	1.0	8.7	5.7	3.1	9.2	6.1	10.2
Maximum at Blackmans Flat	0.3	1.1	1.5	1.1	1.9	1.9	2.6
Maximum at Wallerawang	0.3	1.0	1.6	1.1	1.8	2.0	2.6
10-minute average SO_2 (Criterion: 712 µg/m³)							
Maximum	1993 (3)	-	2527 (5)	2439 (5)	1293 (2)	2665 (6)	2527 (5)
Maximum at Blackmans Flat	155	-	424	340	210	481	424
Maximum at Wallerawang	187	-	2462	296	153	2462	2462
1-hour average SO_2 (Criterion: 570 µg/m³)							
Maximum	1393 (2)	-	1767 (5)	1706 (4)	904 (2)	1864 (5)	1767 (5)
Maximum at Blackmans Flat	108	-	296	238	147	336	296
Maximum at Wallerawang	131	-	1722	207	107	1722	1722
24-hour average SO_2 (Criterion: 228 µg/m³)							
Maximum	82	-	136	139	57	148	136
Maximum at Blackmans Flat	15	-	41	26	16	45	41
Maximum at Wallerawang	19	-	84	36	18	90	84
Annual average SO_2 (Criterion: 60 µg/m³)							
Maximum	2.2	-	10.4	4.4	2.2	11.2	10.4
Maximum at Blackmans Flat	0.7	-	2.3	1.6	0.9	3.0	2.3
Maximum at Wallerawang	0.7	-	2.5	1.6	0.9	3.2	2.5

The dispersion modelling results for CO, TSP, PM_{10}, fluoride, antimony, arsenic, berylium, cadmium, chromium III and IV, lead, mercury, nickel, dioxins and polycyclic aromatic hydrocarbons, were all well under the relevant criteria.

Submissions

Of the 338 public submissions received, 14 submissions (2 percent) raised concerns regarding potential air quality impacts as a result of the project. Of these 14 submissions, six objected to the project being fuelled by coal, five supported the project being fuelled by natural gas, and three objected to the project in its entirety. The stated reasons for the objection to the coal option is partly due to the potential for air quality pollution as a result of the project, including particulate pollution and dust emissions from fly-ash disposal and the risk to human health due to the air quality impacts. The five submissions supported the gas option due to the belief that natural gas is a cleaner technology producing less dust and pollution, compared to coal technology and there will be no ash produced under the gas option, thereby reducing the human health risks of those people who live close to the proposal site. The objections stated in three of the 14 submissions were due to the view that the project will exacerbate environmental and human health issues in surrounding communities partly due to increased air pollution.

Of the twelve Government agency submissions received, three (NSW Health – Sydney West Area Health Service; Mid-Western Regional Council and the Department of Environment, Climate Change and Water) raised concerns regarding potential air quality impacts due to the project. A detailed breakdown of the issues raised is presented in chapter 4 of this Report and the section below notes the specific issues relevant to air quality that were raised.

NSW Health – Sydney West Area Health Service

- Finds that the year modelled for the air quality assessment (2001) had the lowest air pollution records, and therefore the existing air quality may be poorer than predicted. Following from this point, it is concerned that contrary to the conclusion drawn in the Environmental Assessment, the assessment may not present the worst case scenario.
- Notes that the assessment predicts significant increased exposure to mercury, dioxins and PAHs with the coal option and predicts an approximate doubling of exposure to these pollutants at Wallerawang and Blackmans Flat. As there are other potential sources of these air toxins in the vicinity, a cumulative assessment of exposure from all sources is warranted prior to allowing any significant increase in emissions.
- Advises that the existing short-term concentrations of sulphur dioxide exceed guideline values and that the health status of people living in the Lithgow local government area is on many measures worse than in other parts of NSW.
- Strongly supports the proposal to continue monitoring of sulphur dioxide and nitrogen dioxide at Wallerawang and Blackman's Flat and notes that Air Quality Assessments at these locations between 2001-2008 indicate that the existing air quality criterion for sulphur dioxide was exceeded in three of the eight years and could have occurred up to 5 times in 2001.

Mid-Western Regional Council

- Believes that the Environmental Assessment fails to address the impacts of the project on the community partly in relation to coal trains which it believes reduce air quality largely due to dust.

Department of Environment, Climate Change and Water (DECCW)

- DECCW considers that the Environmental Assessment demonstrates that the proposal could comply with current air quality assessment criteria however it seeks clarification and additional information including information required to set emission limits for the proposal.
- States that the proponent should demonstrate that the meteorology assessed will not result in significantly lower pollution concentration predictions than would have occurred if a different year was assessed. Also the proponent should provide a longer-term ambient air quality analysis to demonstrate that 2001 was an appropriate year for simulation.
- Advises that the proponent should provide an explanation as to why synthetic surface meteorological data were input into CALMET when temperature, relative humidity and pressure are all measured at Mt Piper.
- Advises that the emissions data assessed excludes estimates of the quantity of fuel oil needed on an annual basis to ignite the coal fired boilers and advises that future assessment (for example at a project application stage) should assess likely impacts from all fuel types proposed for combustion at the site.

- Believes that the dispersion modelling scenarios for coal could be under predicting ground level concentrations and the proponent should update the assessment to include the existing Mt Piper power station operating at full load (700MW).
- Requires that the proponent conduct further assessment of emission concentration limits for the proposal. The emission concentration limits should be justified in terms of the requirements from Sections 10.2 and 7.2.1 of the Approved Methods. Furthermore the proponent should conduct a revised NO_2 assessment using a transformation method that is specified in the Approved Methods.
- Requests that the Proponent advise whether there is any sensitive land use located in the vicinity of the proposal and if so, consider criteria for Hydrogen Fluoride (HF) on the basis of a 90 day averaged assessment.
- Advises that future assessment should include fugitive particle emissions from the proposal and measures to be implemented to prevent or minimise the generation and emission of dust from the site.
- Advises that an emission concentration limit of 30mg/m^3 would be set for solid particles for the coal option and recommends a limit of 51mg/m^3 for the gas fired option.
- Recommends that the Proponent be required to provide an updated air quality impact assessment as part of its Project Application.

Consideration

The Department notes that the project has the potential to contribute to an exceedance of ambient air quality criteria under either fuel option (cumulative impacts). This can be seen in Table 5, where should the project be fuelled either by coal or natural gas, the highest ground level concentration at Wallerawang for 1 hour average NO_2 could be 264μg/m^3, while the air quality criterion is 246 μg/m^3. However, the Proponent's Environmental Assessment found that the highest levels will be close to the Wallerawang power station site (i.e. within 2 km) rather than close to any sensitive receptors. The highest ground level concentration at Wallerawang for 10-minute average SO_2 would be 2462 μg/m^3 under the coal option, while the air quality criteria is 712 μg/m^3. The highest ground level concentration at Wallerawang for 1-hour average SO_2 would be 1722 μg/m^3, while the air quality criteria is 570 μg/m^3. There is a maximum of 5 hours per year when SO_2 is predicted to exceed the 570 μg/m^3 air quality criterion at present, due to the existing Mt Piper and Wallerawang Power Station sources. However, the maximum number of hours above this criterion is predicted to remain unchanged at 5 hours if the new power station were to proceed. It should be noted that there will be zero contribution of SO_2 from the combustion of natural gas, and therefore the results relevant to this pollutant and the gas option in Table 1 represent results from the existing power stations.

It is important to interpret the results of the air quality modelling in the context of potentially-affected land uses and the magnitude of predicted ambient air quality exceedances. The Department highlights that ambient air quality criteria are currently met at Blackmans Flat, and will continue to be met if the project proceeds (regardless of fuel source). In the case of Wallerawang, modelling indicates that ambient air quality criteria are currently exceeded (for SO_2 and NO_2) as a consequence of the operation of the existing Mount Piper and Wallerawang Power Stations. However, if the project proceeds, it will not increase maximum ground level concentrations of SO_2 and NO_2 at Wallerawang, nor the duration of existing elevated concentrations of pollutants at this location. Further, the Department highlights that although the project would increase the maximum concentrations of SO_2 and NO_2 (within the modelled domain), these peak impacts occur away from the inhabited areas of Blackmans Flat and Wallerawang. In short, the new power station would not have an unacceptable impact at any inhabited location, and although it would increase pollutant concentrations in other areas, this impact would be acceptable noting the uninhabited nature of these locations (and minimal potential that these locations, being forestry, mining, open space and similar land uses, would be inhabited in future). As such, the Department considers that the project could be designed, constructed and operated to meet acceptable air quality outcomes – that is, relevant ambient air quality criteria at potentially-affected receivers.

Although the Department considers the project has the ability to be designed to operate within the air quality criteria, it considers that the Proponent needs to undertake further work to refine the air quality assessment for project (as part of the future design process and project application). This refinement needs to focus on two aspects of the Proponent's assessment, the first being the methodology employed in determining the pollutant emissions, and the second issue being the identification of sensitive receptors.

With regards to the first issue being the methodology employed, the use of the 2001 meteorological data is not considered as an ideal year to use for the assessment, as it is not necessarily representative of the average mean wind speed and percentage of calms for the years 2001 to 2004 (note 2005 has been excluded due to the low amount of data recovered). The Department commissioned Heggies Pty Ltd to undertake an independent peer review of the air quality assessment. This independent peer review, as well as the DECCW's review, found that using the 2001 year as a representative year has the potential to predict lower pollution concentrations at ground level than would have occurred if a different year had been used in the assessment. To address this issue at the concept plan level, the Proponent provided additional dispersion modelling as par of its Submissions Report using meteorology from 2004 to assess any differences in model results, compared to the Environmental Assessment. The Proponent's updated dispersion modelling assessed the pollutant SO_2 as a one-hour average (result obtained using 2004 data is 1,045 $\mu g/m^3$, whereas for 2001 data it was 1,393 $\mu g/m^3$), 24-hour (result obtained using 2004 data is 155 $\mu g/m^3$, whereas for 2001 data it was 82 $\mu g/m^3$) and annual average ground-level concentrations (result obtained using 2004 data is the same as that derived using the 2001 data, 2.2$\mu g/m^3$). The Department considers that although these results obtained by the Proponent demonstrate that the Environmental Assessment using the 2001 meteorological data does not result in significantly lower predictions than for an alternative year, the pollutant NO_2 and the concentrations at Wallerawang and Blackmans Flat were not included in this updated assessment. Given NO_2 levels were predicted to exceed the air quality criteria in the model domain (a 25km by 25km region) and at Wallerawang, and the 1-hour average SO_2 levels at Wallerawang was predicted to exceed the amenity criteria using the 2001 meteorological data, the Department finds requiring the Proponent to undertake further dispersion modelling to assess NO_2 and SO_2 levels, using the 2003 meteorological year (2.4 m/s average wind speed and 7.0 per cent calm winds) is warranted before it seeks project approval for the preferred option. The model 2003 year would characterise a more representative meteorological year.

The second issue being the identification of sensitive receptors, also requires further project-level assessment by the Proponent. The air quality assessment takes the air quality monitoring stations at Wallerawang and Blackmans Flat as receptor locations. However, the townships of Portland and Cullen Bullen have been shown to be within the modelling domain in the Proponent's Environmental Assessment, although the predicted concentration levels at these two townships have not been included by the Proponent. The result for the highest ground level concentration in the model domain cannot be asserted to be representative of the pollution concentrations at these townships, as the point at which the highest concentration was found. This uncertainty means it is necessary for further assessment of potential air quality impacts at the closest sensitive receptors, under both fuel options.

Due to the two shortcomings found above, the Department recommends a condition that requires the Proponent to provide an updated air quality assessment as part of any subsequent project application for the project.

The pollutants NO_2 and SO_2 have the potential to cause exceedances of the criteria. All other pollutants have been predicted to comply with the criteria. Under the coal-option, the results show that maximum 1-hour average NO_2 concentrations would increase from 249$\mu g/m^3$ to 338 $\mu g/m^3$, and the maximum number of hours above the 249$\mu g/m^3$ criteria would increase from 1 to 2 hours per year, due to the cumulative impacts of the existing Mount Piper Power Station and this Project. Also the highest levels would be close to the Project facility (i.e. within 2 km). Under the gas-fuelled option, the results show that there would be no change to maximum 1-hour average NO_2 concentrations. This means that the highest 1-hour average NO_2 concentrations would be 249$\mu g/m^3$, with a maximum of 1 hour above the criterion. The highest levels would be close to the project facility (i.e. within 2 km) and no exceedances of the criterion would occur at any sensitive receptor location. With regards to 1-hour average SO_2 concentrations, the maximum number of hours above the 570$\mu g/m^3$ criterion is predicted to remain unchanged at 5 hours if either of the fuel options used to operate the Project is added to the existing sources. The Department notes that the Proponent has committed to select and maintain plant equipment in a manner that ensures pollutant concentrations will meet the air quality criteria. Due to the findings, the Department considers that the maximum predicted contributions from the project are acceptable in concept and that further assessment is appropriate at a project application stage, rather than before a determination is made of the concept plan.

The Department considers the Proponent's use of synthetic surface meteorological data for input into CALMET is appropriate, as the Department understands that temperature, humidity and pressure data were only

available from the year 2002 onwards. The absence of these parameters in the 2001 records would not provide sufficient grounds for discarding this year, given there are complete records of wind speed and wind direction for this year. The Department notes that wind speed and wind direction are important parameters for dispersion modelling. However it is important to ensure that the meteorological data derived from the computer model reflects the actual meteorological conditions across the modelling domain. For this reason, the Department, as part of the recommended condition requiring the preparation of an updated Air Quality Assessment, requires the Proponent to consider worst-case meteorological conditions and operating scenarios as well as cumulative impacts from contemporaneous operations of the existing Mount Piper and Wallerawang Power Stations as well as any other relevant land uses in the locality.

The Department acknowledges that the Proponent's Environmental Assessment does not consider the properties of fuel oil to be used to ignite coal fired boilers, nor does the assessment provide an estimate of the quantity of fuel oil to be used by the proposal on an annual basis. The Department notes that the existing fuel oil system for Mt Piper Power Station Units 1 and 2 comprises of two storage tanks, an overflow tank, a fuel treatment system and dual pipelines to the power station. The proposal will require its own fuel oil system, should the project be fuelled by coal, and it would be similar to the existing system. The Department finds that as the Project is proposed to operate 24 hours a days, seven days a week, in a given year, there will only be short periods of time in which the proposed plant would be required to start up, shut down and then start up again. This means the amount of emissions created from the use of fuel oil will be minimal and therefore the Department finds that the Proponent not considering fuel oil as part of the Concept Plan Application is reasonable.

The Proponent's Environmental Assessment indicates that the existing Mt Piper Power Station Units 1 and 2, has been upgraded to operate at a full load capacity of 700 megawatts, however as noted by the DECCW, the dispersion modelling scenarios in the Environmental Assessment are based on the power plant when it operated at 660 megawatts at full load. As such, the dispersion model could be under predicting ground level concentrations. The Proponent, in its Submissions Report, reviewed stack testing data of this current year (2009) to assess the variability of emissions at different plant loads. Table 6 below shows the Proponent's comparison of modelled emissions with actual emissions.

Table 6: Comparison of Modelled Emissions in Environmental Assessment with Actual Emissions (derived from the Proponent's Submissions Report)

Duct	Date	Load (MW)	Flow (Nm^3/s)	NO_x conc (g/Nm^3)	NO_x Mass (g/s)	SO_2 conc (g/Nm^3)	SO_2 mass (g/s)
MP1b	7/07/2009	700	340	0.85	290	1.2	410
	17/06/2009	660	330	0.74	250	1.3	440
	24/03/2009	660	350	1.2	410	1.1	390
MP2a	8/07/2009	660	340	0.72	210	1.2	330
	26/05/2009	660	360	0.74	220	1.1	340
	24/03/2009	660	350	0.83	250	1.2	360
4 duct data			1380	0.85	1087	1.18	1513
Modelled Emissions		660	1469	0.97	1422	1.06	1550

The Proponent found, based on Table 2, that the mass emissions used for modelling are higher for both SO_2 and NO_x than the average of 2009 stack test data which includes operations on one unit at 700 megawatts for one sample. The Proponent states that based on the results in Table 2, modelling for the existing Mt Piper Power Station, based on a 2x660 megawatt configuration, will not underestimate SO_2 and NO_x impacts when compared to operations at 2x700 megawatts. The Department however is not satisfied that for the coal option, the Environmental Assessment would not be under predicting ground level concentrations, given only one sample of the existing power station operating at full load (700 megawatts) has been used by the Proponent. As such, the Department has recommended a condition that requires the Proponent to include worst-case

meteorological and operating conditions taking into account the operations of other power stations in the locality as part of an updated Air Quality Assessment.

NO_2 Exceedances are Predicted

Both the DECCW and the Independent Review commissioned by the Department found that the Proponent's use of a 30 per cent conversion of NO_x to NO_2 is not consistent with the requirements of the DECCW's *Approved Methods* Guideline. Accordingly the Proponent should conduct a revised NO_2 assessment using a transformation method that is specified in the *Approved Methods* Guideline. The Proponent included a revised assessment in the Submissions Report, using the ozone limiting method as illustrated in the *Approved Methods* Guideline, rather than using the results from the air quality monitoring data. From this, the Proponent determined that the predicted maximum 1-hour average NO_2 concentration will be 248 $\mu g/m^3$ under the coal-fired option, rather than the 365 $\mu g/m^3$ maximum that was presented in the Environmental Assessment. Although the Proponent states that the maximum levels occur next to the power station site and as such the maximum NO_2 concentrations will be below the 246 $\mu g/m^3$ criterion at all sensitive receptor locations, the Department's recommendation of requiring the Proponent to undertake further air quality assessment will allow confirmation of this finding.

Due to the above considerations, the Department has recommended that the Proponent undertake further assessment with respect to air quality, should it seek project approval for either of the fuel options. The results of this further assessment would be submitted as part of any future project application for the Project. The Department is however satisfied that in concept the predicted air quality impacts as a result of the Project's operation are likely to be acceptable.

5.3 Water Management (Construction)

Issue

The Project site is located in the upper catchment of the western arm of Neubecks Creek (the existing Mount Piper Power Station is also within this location). The project site is adjoined on three sides by steep hill-slopes which are drained by small, ephemeral creek lines to Neubecks Creek, which in turn flows east and south to join the Coxs River. The Coxs River flows south through Lake Wallace and Lake Lyell, and eventually joins the Hawkesbury River. South of the site is the eastward flowing Pipers Flat Creek, which joins Coxs River north of Wallerawang Power Station. Thompson Creek is a north flowing tributary of Pipers Flat Creek.

Due to the surrounding waterways to the proposal site, the main water quality impacts from the construction of the project would be associated with the movement of sediments and nutrients to these local waterways, as a result of soil erosion. The project site is located within the Upper Coxs River sub-catchment, which is part of the Sydney Drinking Water Catchment and therefore there is potential for surface water runoff to impact upon the water quality of the Neubecks Creek, which in turn may impact the quality of the local drinking water. The Proponent has committed to preparing a Soil and Water Quality Management Plan for the construction stage of the project, with the objective of no increased sedimentation of nearby waterways to occur and also for the identification and management of any contaminated fill and the potential for groundwater impacts.

Submissions

From the 12 Government submissions received, five raised issues regarding water impacts. Of the five, one submission, the Sydney Catchment Authority specifically commented on water quality impacts relevant to the construction stage of the project. The Sydney Catchment Authority considers the proposal is likely to achieve a neutral or beneficial effect on water quality and thus states that this should be a requirement during construction (and operation) where works do not adversely affect the quality of surface and ground waters beyond the boundaries of the site.

Consideration

The Department considers that although the Proponent has proposed a range of erosion and sediment control measures for the construction stage of the project, the Environmental Assessment does not detail the specific activities that could potentially cause water quality impacts. The Department must first be able to determine the maximum amount of impacts that have the potential to occur, before it can be satisfied with proposed mitigation and management measures. This is aligned with the concept plan nature of the subject application. For example it is unclear as to whether the transportation of construction materials to the site, heavy machinery,

storage of materials or human movement would be the significant factors contributing to erosion and sedimentation and the magnitude of such soil disturbance. As the Environmental Assessment focuses on the mitigation and management measures, rather than detailing the activities that may trigger such impacts, the Department has recommended a condition that requires the Proponent to detail all those specific activities that have the potential to cause adverse impacts to local water quality and then compare these determined impacts with the nominated erosion and sediment control measures outlined in the Environmental Assessment. From this comparison, the Proponent must then determine the final suite of measures to be incorporated into the construction stage of the project, to ensure no adverse impacts to water quality occurs. The Department is satisfied that this recommendation addresses the Sydney Catchment Authority's concern of water quality impacts. The Department is also satisfied that this recommendation will ensure that the Department is provided with further information regarding the significance of impacts to waterways as a result of construction and the measures to avoid such impact, before the Proponent seeks project approval for the preferred option.

5.4 Water Management (Operation)

Issue

Water Usage

The Proponent states that water and waste management systems may use existing infrastructure from Mount Piper Power Station Units 1 and 2. The Proponent's calculated annual raw water usage for the coal-fired option was based on a 90 per cent capacity factor and its calculation 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 this proposed extension project. The annual net raw water usage was estimated to be 1016 ML/y as outlined in Table 7. The total volume of demineralised water to go into the project from the shared water treatment system has been calculated to be 469 ML/y. The water losses from the project have been determined to be from evaporation losses from different systems on the project site (855 ML/y), from water mixed with disposed ash to reduce dust impacts (239 ML/y), from pre-treated water to the shared demineralised water plant (215 ML/y), from the project waste water to shared settling ponds for recycling (180 ML/y) and from the project waste water to shared clean water ponds for recycling (113 ML/y). The Proponent states that the volume of water required for the proposal (1016 ML/y of raw water) meets the existing availability of water from the water supply sources. No changes to the existing Water Management Licence or other agreements would be required to provide water for the proposal. The 'zero discharge' water regime would also apply to the proposal.

Raw water usage for the proposed gas-fired power plant option was also estimated by the Proponent, assuming water would be required for domestic purposes, fire fighting, maintenance, wash-downs, compressor washing, make-up to the water steam cycle, evaporative coolers and fogging systems. The evaporative coolers and fogging systems may be fitted to the gas turbines to increase output on hot days and to increase gas turbine output on the hottest days. A spray may also be installed in the air cooled condenser to maintain a low steam turbine back pressure during the hottest days. The total demineralised water usage would be approximately 271 ML/y depending on design requirements and the total raw water usage would be 460 ML/y (300 ML/y for demineralised plant feed and 160 ML/y for evaporative cooling).

Table 7: Annual Water Demand Requirements Estimated for both Fuel Options

Water Usage	Quantity (ML/ year)
Coal Option	
Supplied water to extension	
Total raw water supply into the extension	1016
Total demineralised water into the extension from the shared water treatment system	469
Rainfall	117
Water losses from the project	
Evaporation losses from different systems in the extension	855
Water mixed with disposed ash	239
Pre-treated water to the shared demineralised water plant	215
Extension waste water to shared settling ponds for recycling	180
Extension waste water to shared clean water ponds for recycling	113
Total water losses	1602

Gas Option	
Demineralised water	
Steam Cycle Makeup	200
Fogging	11
ACC Cooling	60
Total Demineralised Water	271
Raw Water	
Demineralised plant feed	300
Evaporative cooling	160
Total Raw Water	460

Water Treatment

The operation of the power station, under either coal or gas fuelled options, would produce water quality pollutants and therefore must be managed appropriately to ensure no such pollution of water occurs. As part of the existing Mt Piper Power Stations Units 1 and 2, oil contaminated plant drainage, wash-down and fouled rainwater is directed via gravity pipelines to two contaminated water pumping systems. 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. The Proponent states that if this existing operation is unable to accommodate the extra flow from the proposal, an independent collection and separation system would be provided.

For the coal-fired option, the Proponent states that water discharges would be directed to the existing brine concentrators. Brine concentrator product water would then be used as feed to the demineralisation plant and brine concentrate would be directed to waste brine ponds. Brine concentrate would most likely be disposed of with ash, as it currently occurs for the existing power station. The Proponent states that the new units would not affect the 'zero discharge' operation of the existing power station.

For the gas-fired option, effluent water is to be produced by waste from the demineralised water treatment plant, blowdown from the water/steam cycle, chemically contaminated wastes, blowdown from the evaporative cooler, gas turbine compressor water wash waste, oily wastes and clean stormwater. Effluent derived from the demineralised water treatment plant, blowdown from the water/steam cycle and chemically contaminated wastes would be managed by on-site treatment and neutralisation and any resultant effluent would be reused on site, disposed of to the existing power station site or collected and disposed of by a licensed contactor. Alternatively, these waste streams could be piped directly to the existing power station plant for treatment. The expected volume of this water is approximately 25t/h and the Proponent states that it could probably be used to offset raw water demand at the existing plant. Blowdown from the evaporative cooler if installed, would not need on-site treatment and the Proponent states that it could be used to offset cooling water demands at the existing coal-fired power station. The Proponent states that 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. All bathroom and sewage waste would be sent to the existing sewage treatment plant (as for the coal-fired option). Oily wastes would be collected and the oil removed in separator with the resultant effluent sent to the existing sewage treatment plant. Clean storm water would be reused where possible, and where not, disposed of to the existing or extended (if required) plant storm water system and discharged via the licensed discharge point to Neubecks Creek.

The Proponent has stated that for the existing Mount Piper Power Station and for this proposal, a significant reuse program is and will be in place, thereby minimising the requirement for raw water and ensuring maintenance of its 'zero discharge policy'.

Submissions

Five Government Agency submissions raised concerns regarding water supply and pollution during the operation of the project:

- The NSW Health advises that water availability in the Lithgow area is an ongoing issue that requires close monitoring by the relevant agencies.
- The NSW Office of Water (NOW) requests that the conditions of approval address water security contingencies during periods of drought and sustainability of water supply having regard to the water

allocation under the current licence whereby Delta is bound by flow- related extraction limits under Part 9 of the *Water Act* 1912.

- Lithgow City Council (LCC) advised that outdated water figures (2001) were used for the assessment and that updated water modelling should be used. LCC propose adequate water requirements for cooling and resultant impacts if required. It is concerned about water sources and impacts.
- The Sydney Catchment Authority (SCA) considers the proposal is likely to achieve a neutral or beneficial effect on water quality and this should be a requirement during operation (and construction) where works do not adversely affect the quality of surface and ground waters beyond the boundaries of the site.
- The SCA advises that given the existing significant extraction of water from the Cox's River by Delta for various activities, there may be a reduction of the sustainable median extraction from Lake Lyell in the future due to drought and climate change. The SCA would be concerned should any additional usage of water from the Cox's River catchment be proposed in the future.
- The Department of Industry and Investment advises that the "zero discharge" policy for wastewater is maintained due to possible contamination of discharge water into Neubecks Creek.

From the 357 public submissions received, 35 raised issues regarding hydrological impacts, all of which were specifically related to the operation stage of the project. A summary of the key issues raised is presented below.

- The Nature Conservation Council is concerned about the permeability of the ground which has increased by three orders of magnitude due to long wall mining and pillar extraction that cause subsidence and its effect on the natural environment of Newnes Plateau area. An increase in the extraction of water to service the new Mt piper station is of great concern and a thorough environmental assessment must be conducted to determine the effects on Newnes Plateau and downstream of the coal mines and power station complex.
- Six public submissions state that as Mount Piper is located in an inland water catchment reliant on rainfall, irrigation water for agriculture (and food security) is important and mineral extraction such as coal is not compatible with such use. Meaning water that is to be used for cooling purposes would be better employed in agriculture and/ or maintaining environmental flows. These submissions further state that there is not sufficient water available from Cox's River system to sustain the project and all other activities in the region and the Cox's river would become polluted from the project due to power station discharge.
- 14 submissions state that new coal fired power stations will consume more of the available water supplies. One of these submissions is from an organisation that further states that water resources of Newnes Plateau should be protected from any additional water extraction, as further extraction could cause the nationally endangered upland swamps of Newnes Plateau to dry out.
- Seven submissions suggest that the availability of water usage for this proposal, together with drought conditions would impinge on local water supply for community.
- Two submissions stated that the use of carbon capture technology requires additional water and therefore questions whether the Sydney drinking water supply can sustain this large extra water demand. These two submissions also states that there will be cumulative impacts on a number of water systems/ quality from the expansion of coal mining and environmental issues associated with this have not been acknowledged in the Environmental Assessment.
- One submission specifically raised an objection to the project under the coal-fired option, based on the potential for polluting the Cox's River.
- Four submissions state that the project under the coal-fired option will exacerbate environmental and human health issues in surrounding communities due to increased water (and air) pollution.
- One submission states that the Government needs to move to technologies that are not water dependent (states wind, solar and energy efficiency, also hot rock geothermal, biomass and solar thermal).

Consideration

From its review of the Environmental Assessment and the issues raised in the submissions, the Department considers that there are three matters that require consideration, these being the proposed use of existing resources for water supply and treatment, water security and water quality (pollution) impacts.

Use of Existing Resources for Water Supply and Treatment

The Department notes that Delta Electricity owns and operates the existing Mt Piper Power Station and Wallerawang power station. The amount of water required to operate these power stations is sourced from the Coxs River systems and the Fish River system, under existing licences and agreements. Delta Electricity is entitled to extract up to 23,000 ML/y of water from the Coxs River under its Water Management Licence issued by State Water which is valid until 2025, subject to review periods. Delta Electricity is entitled to extract a maximum of 8,184 ML/year of water from the Fish River under the Fish River Water Supply Agreement, however in drought conditions this allocation is reduced. As such, as at August 2009, Delta Electricity's allocation is reduced to 40 per cent (3,274 ML) of the total maximum available amount under the agreement. Delta Electricity has also made an agreement with Springvale Coal in 2006, which makes provision for mine water to be transferred from the Springvale/Angus Place mine complex to Wallerawang Power Station via a water transfer scheme. This system has a design capacity of 30ML per day and has averaged a transfer rate of approximately 15ML per day since the commissioning (subject to its availability and mining operations). In 2007/2008, this water transfer scheme supplied 4,485 ML of water to Delta Electricity for its existing operations. The total volume of raw water required for the Project would be 1016 ML/year for the coal-fired option or 460ML/year for the gas option. The annual average water use for the existing Wallerawang and Mount Piper Power stations is approximately 23,000ML (14,150 ML for Mt Piper and 8,750 ML for Wallerawang). The Department therefore is satisfied that the required volume of water for the Project can be obtained under the existing licences and agreements and that no additional sources of water would be required for the Project.

As it is unclear whether or not the existing Mount Piper Power Station water treatment facilities can accommodate the flow of water from the proposal, the Department has recommended a condition that requires the Proponent to determine this, as part of a Water Cycle Balance. This will ensure the Proponent is able to provide an independent collection and separation system, should there be no available capacity to treat the water from the existing power station.

As the water requirements for the project may not be the same as described in this concept plan application, as the design requirements of the project are yet to be finalised and certain components of projects may not be incorporated into the final design, the Department recommends a condition which requires the Proponent to detail the project's water cycle balance.

Water Security

The Department is satisfied that there is enough water available under existing licences and agreements to cater for the project's operation, under either of the fuel options. However the Department concurs with the NSW Office of Water that there is potential for this availability to be at risk under drought conditions. For example, as discussed above, the amount of water that Delta Electricity can extract from the Fish River has been reduced by 40 per cent due to drought conditions. For this reason, the Department recommends a condition that requires the Proponent to develop a Water Supply Contingency Plan to address water supply having regard to the water allocation under the current licences and agreements. This Plan would need to take into account all activities that are currently using and are proposed to be using (this project) the allocated amount of water with the aim of ensuring adequate amount of water will be available for the ongoing operation of the project in periods of drought.

Water Quality

The Department considers that although the Proponent has stated that the proposal would reflect the operational status of 'zero discharge', it has not provided complete information that demonstrates such a status will be achieved and more importantly it does not provide details on its proposed reuse water program. For these reasons, the Department has recommended a condition which requires the Proponent to describe the recycling practices it proposes to use for the operation of the proposal and compare these with those existing recycling practices of the existing Mt Piper Power Station. The Proponent must identity any shortcomings of the existing recycling practices and how the proposed recycling practices for the Project have been developed in response to these shortcomings, with the aim of better re-using the water. The information on the proposed recycling practices must also identify the limitations with the proposed re-use potential of the water, for example ionic and cationic substances cannot be mixed and capacity of storage tanks to hold the effluent water.

The Department has also recommended a condition that requires the Proponent to detail, as part of the Water Cycle Balance, the management measures proposed during both construction and operation to ensure the project will achieve a neutral or beneficial effect on water quality.

The Department is satisfied that the project will be able to operate within current water allocations available to the existing Mt Piper Power Station and that all wastewater will be treated on site. The Department however requires the Proponent to provide further detailed information regarding the security of this water supply and measures employed during construction and operation to ensure that the project will have a neutral or beneficial effect on water quality. The Department will be provided with this further assessment information when project approval will be sought for the preferred option.

5.5 Noise and Vibration

Issue

The Proponent identified four residential locations at which noise monitoring took place for the purposes of establishing background noise levels around the project site (A to D). Background noise levels were measured both unattended and operator attended at locations A to D between September and October 2005 and between July and August 2006. Based on the ambient noise monitoring, the Proponent determined noise criteria for the Project. These are summarised in Table 8.

Table 8: Project Noise Goals for Residential Receivers

Description	Day	Evening	Night
Operational Criteria	$L_{Aeq15\ min}$	$L_{Aeq15\ min}$	$L_{Aeq15\ min}$
Location A (Back Cullen Rd, Portland)	37 dB(A)	39 dB(A)	36 dB(A)
Location B (Humphrey St, Portland)	35 dB(A)	35 dB(A)	35 dB(A)
Location C (Irondale Rd, Pipers Flat)	35 dB(A)	35 dB(A)	35 dB(A)
Location D (Noon St, Blackman's Flat)	44 dB(A)	39 dB(A)	36 dB(A)
Traffic Noise Criteria	L_{Aeq1hr}		L_{Aeq1hr}
Collector Roads	60 dB(A)	N/A	55 dB(A)
Sleep Disturbance Criteria	N/A	N/A	$L_{A1\ 15\ min}$
Location A			46 dB(A)
Location B			40 dB(A)
Location C			38 dB(A)
Location D			46 dB(A)
Construction Noise Criteria	$L_{A10\ 15\ min}$	N/A	N/A
Location A	37 dB(A)		
Location B	35 dB(A)		
Location C	35 dB(A)		
Location D	44 dB(A)		

Construction

For construction noise, the Proponent's assessment was prepared generally in accordance with the Environmental Noise Control Manual (ENCM) rather than the DECCW's Interim Construction Noise Guideline (ICNG). It was assumed that the noise generated from construction would be the same whether the gas or coal option were pursued. As part of the assessment, the Proponent identified a typical construction scenario based on items of equipment and assumed allocated sound power levels as a guide, rather than as a worst case scenario. The Proponent's predicted construction noise levels at locations A to D under neutral weather conditions were less than 30 dB(A), being below ENCM and ICNG construction noise criteria. The Proponent found that noise levels generated from construction works will meet the existing background noise levels at the closest sensitive receiver.

Operation

The Proponent has undertaken an operational noise assessment of the coal and gas power station options generally in accordance with the NSW Industrial Noise Policy (DECC, 1999). For the coal-fired option, the results of the noise predictions at the nearest residences for neutral and adverse meteorological weather conditions, along with criteria for night-time operations are presented in Table 9 below. The Proponent advises that these results have been adjusted to account for low frequency noise impacts by adding 5 dB(A) to the

predicted values. The results indicate that the predicted noise levels would provide compliance with the INP criteria for night-time neutral weather conditions. Predictions under adverse weather conditions indicate that there is potential for marginal exceedence of the project specific criteria during these times.

Table 9: Predicted Levels at Key Residential Locations Coal Fired Option

Location	Neutral Weather Conditions $L_{Aeq(15\text{-}minute)}$	Adverse Weather Conditions $L_{Aeq(15\text{-}minute)}$	INP Default Adverse Weather Conditions $L_{Aeq(15\text{-}minute)}$	Criteria
	Day or Night	Night	Night	Day or Night
A	33 dB(A)	33 dB(A)	34 dB(A)	36 dB(A)
B	30 dB(A)	30 dB(A)	31 dB(A)	35 dB(A)
C	35 dB(A)	35 dB(A)	39 dB(A)	35 dB(A)
D	33 dB(A)	36 dB(A)	36 dB(A)	36 dB(A)

For the gas-fired option noise-modeling scenario, all six combined cycle gas turbines (CCGT) were included under steady continuous operational load for a worst-case scenario. The proponent advised that the major sources of noise include the exhaust stack, the air intake, the turbine building, the transformer building, air-cooled condensers and the cooling towers which could be a significant source of noise. All of these components tend to have a low noise frequency, which attenuates at a slower rate than the higher frequencies and can persist over long distances. These low frequencies also respond less to attenuation measures applied at the source of the emissions.

The Proponent advises that gas fired power stations have more stop/start noise influences than coal fired power stations. The Proponent decided that due to the intermittent nature of these activities, they have not been included in the modeling of normal operational noise emissions at the external receivers. Consequently intrusive noise levels could be higher than anticipated. The Proponent assessed these impacts against the DECCW sleep disturbance guidelines to determine the potential for impacts during these periods. Noise emissions used in the sleep disturbance noise assessment were based on the shutdown operation of a 175MW class open cycle gas turbine (OCGT) plant which is considered to be representative of the worst-case scenario. The noise emissions at shut down were estimated at 103 dB(A) at 20 m for a short period of up to about 30 seconds. The results indicated that the noise level for peak events from the CCGT are expected to be significantly lower than the sleep disturbance criteria at all sensitive receiver locations. The Proponent advised that noise emissions can be reduced by first passing the gas through a silencer.

The results of the noise predictions at the nearest residences for neutral and adverse meteorological weather conditions are presented in Table 10. These results indicate that the predicted noise levels for the CCGT option would comply with the INP Night-time criteria at all locations under neutral and assessed adverse meteorological conditions. Predictions of noise impacts due to default adverse weather conditions indicate the potential for a marginal exceedance at residential locations in Blackmans Flat and a substantial exceedance by up to 5dB(A) of the project specific criteria for residences in Pipers Flat, to the south of the power station. This is primarily due to the addition of a low frequency penalty being applied to the combined influence of the power station and the coal unloader. Under normal circumstances, the coal unloader operations would not draw the low frequency penalty in its own right.

Table 10: Predicted Levels at Residential Receivers under the CCGT Option

Location	Neutral Weather Conditions $L_{Aeq(15\text{-}minute)}$	Adverse Weather Conditions $L_{Aeq(15\text{-}minute)}$	INP Default Adverse Weather Conditions $L_{Aeq(15\text{-}minute)}$	Criteria
	Day or Night	Night	Night	Day or Night
A	31 dB(A)	31 dB(A)	33 dB(A)	36 dB(A)
B	27 dB(A)	27 dB(A)	29 dB(A)	35 dB(A)
C	35 dB(A)	36 dB(A)	40 dB(A)	35 dB(A)
D	32 dB(A)	36 dB(A)	36 dB(A)	36 dB(A)

Submissions

Four public submissions raised concerns about the accuracy of the noise modelling whereby they raise the issue that Blackmans Flat is not 3km away from the project area as stated in the EA but only 2km from the existing Mt Piper Power Station smokestack and just 1km from the Mt Piper Flyash repository. Three of those submissions raised concerns that the proposed dry-cooling system will be far noisier than the wet cooling system currently used at Mt Piper Power Station. Due to the location of the power station on a hill, they are concerned that noise is likely to be carried by wind and convection currents a long distance towards the south-east to sensitive residential receivers at Blackman's Flat, Castlereagh Highway and View Street in particular.

DECCW raised concerns that the noise impact assessment does not include a comprehensive identification or listing of noise sensitive receivers around the Mt Piper power station extension footprint. DECCW recommend that noise limits apply to the whole power station (the existing and proposed extension). Should the proponent wish to operate the power stations as separate entities, the noise contribution from the extension would need to be determined. DECCW has recommended for the conditions of approval, noise limits on the basis of the night-time PSNLs in the Proponent's Environmental Assessment that would apply to the existing and proposed power station extension.

The MWRC fears that the coal option may result in coal trains traversing from a new coal mine to the north west of the region across to Mt Piper along tracks that have previously not been used to transport coal which pass through urban areas. The MWRC believes that the EA fails to address the impacts of the project on the community in relation to coal trains which it believes will generate noise, cause sleep disturbance and result in significant impacts on lifestyle and standard of living of local residents.

Consideration

The Department considers that the key noise related issues for consideration as part of the assessment of the project are general operational noise impacts and cumulative noise impacts on sensitive receivers. The Department is satisfied that construction noise impacts can be appropriately and adequately managed through the application of best practice construction techniques. The Department is satisfied that the project has the ability to meet the noise goals recommended to ensure no adverse noise impacts will occur to the nearest residential receptors. With regards to potential vibration impacts, the Department is satisfied that the construction and operation of the Project will not cause vibration impacts to sensitive receivers due to sufficient separation distance.

Determining Existing Background Amenity

The Department notes that the noise survey conducted in 2005 was in a period of unstable weather conditions, which resulted in the discarding of many data obtained from the noise logger. Also the Independent Review found that only single 15-minute night-time operator-attended noise measurements were conducted at the residential receiver locations (A to D), with the existing Mount Piper and Wallerawang Power Stations being audible at times but the level of audibility was not quantified. As such, the Department recommends that unless demonstrated by further background noise surveys conducted in accordance with the INP, the Proposal shall adopt a rating background level (RBL) of 30dB(A) throughout the daytime, evening and night-time at all residential assessment locations with the exception of Blackmans Flat where a daytime RBL of 40 dB(A) and an evening RBL of 35 dB(A) applies. The Department acknowledges that the Proponent recommends the control of potential noise emissions from the extension through careful design that may provide lower intrusive noise emissions than those identified under the INP.

Construction Noise

The Department understands that the Proponent is yet to prepare accurate noise estimates for construction noise until further design details of the Project are determined. The Department has however noted that the Proponent has not prepared the exiting analysis in line with the *Interim Construction Noise Guidelines* (ICNG-DECCW) (INCG) and the preparation of a worst case scenario noise analysis. For this reason, the Department recommends that at the project application stage, the Proponent is to establish typical worst case scenarios for the purposes of impact assessment, considering noise enhancing weather conditions and noisy construction equipment selection and prepare the assessment in accordance with the *Interim Construction Noise Guidelines* (DECC, 2009).

Operation

As the modeling for the coal and gas fired options was based on assumptions related to equipment such as particular turbine type which have different associated noise attenuation technology that result in individual noise characteristics, further analysis will need to be conducted when the preferred fuel option is selected to accurately determine noise impacts. At detailed design stage the Proponent shall consider potential noise controls for all acoustically significant items of plant and equipment including (but not limited to) the Induced Draft (ID) Fan and Forced Draft (FD) Fan as well as the sound transmission loss performance of the proposed building enclosures. The effectiveness of the proposed noise mitigation measures will also need to be investigated in terms of reducing potential low frequency noise emissions from the Project to the nearest noise sensitive receivers to the satisfaction of the Department, in consultation with the DECCW.

The Proponent's noise modelling results (the predictions), exceed the project noise goals by up to 4 dB(A) for the coal-fired option and 5dB(A) for the gas-fired option. Although the Proponent has stated that the reason for this difference is that predictive noise levels of the Western Rail Coal Unloader were used in the modelling, rather than used actual noise data, as it is not yet built. The Proponent further stated that the inclusion of the predicted Western Rail Coal Unloader noise levels in conjunction with the Industrial Noise Policy default meteorological conditions and the application of the Low Frequency Noise Penalty is the main reason why noise level predictions are higher than the Project Noise Goals. However the Department, after consultation with DECCW, has recommended operational noise limits that do not exceed the Project Noise Goals. As source noise emissions will be constant across the assessment periods, and night time default meteorological parameters are likely to represent the most noise enhancing conditions, the night time Project Noise Goals have been applied across all day, evening and night periods. These noise limits are recommended to apply to the whole power station facility (existing Mt Piper Units 1 and 2 and proposed Mt Piper Units 2 and 3 power station).

Cumulative Assessment

The Department notes that the noise level predictions (cumulative) made by the Proponent included the existing Mount Piper Power Station Units 1 and 2, the proposed Mount Piper Power Station Units 3 and 4 (the subject proposal), and the Western Rail Coal Unloader. The proposal site is classified as Rural under the Industrial Noise Policy, where the acceptable noise amenity levels for rural residential areas are 50dBA, 45 dBA and 40 dBA for day, evening and night periods respectively.

The Department commissioned Heggies Pty Ltd to undertake an independent peer review of the noise assessment. The peer review noted that individual project noise contributions were not provided by the Proponent. The peer review found that the Proponent's noise assessment relies upon a relatively modest assessment of existing industrial amenity levels. Therefore the Department has recommended that the Proponent prepare a comprehensive cumulative noise amenity assessment of existing developments, approved developments and the Project, relative to the nearest sensitive receivers. The Department finds that this further assessment requirement relevant to a project application for the preferred option will ensure that the cumulative noise levels to be generated within the vicinity of the proposal site (with the inclusion of the Project), can be further assessed to ensure that the cumulative noise can be controlled and meet the acceptable amenity criteria at the residential receiver locations.

5.6 Cumulative Amenity Impacts

Issue

Blackmans Flat, a group of approximately 19 houses, is located 2,800 metres from the proposed power station site. There are receptors located closer to, or within the same distance of, the proposed power station site (Back Cullen Rd, Portland, 1700 metres, Humphrey Street, Portland, 2800 metres and Irondale Road, Pipers Flat, 1800 metres), however Blackmans Flat, is closely surrounded by several existing, approved but yet to be completely constructed, and proposed infrastructure developments sites. There are three existing developments located in close proximity to Blackmans Flat, the first being the Mount Piper Power Station Units 1 and 2, located approximately three kilometres from Blackmans Flat. The second development is the Brine and Ash Co-placement Area (known as Disposal Area 1), located adjacent to Blackmans Flat, used to store the ash and brine generated from the existing Mount Piper Power Station. The third existing development is the Wallerawang Power Station (which includes the Wallerawang Power Station ash disposal area, known as Kerosene Vale Stage 1 Ash Repository), located approximately three kilometres from Blackmans Flat. There are also two developments that have been recently approved for construction that are located in close proximity

to Blackmans Flat, this being the Kerosene Vale Stage 2 Ash Repository Project and the new Lithgow Council Land Fill Site. The Kerosene Vale Stage 2 Ash Repository Project is an extension to the existing Kerosene Vale Stage 1 Ash Repository Area and was approved by the Minister for Planning on 26 November 2008, under Part 3A of the Act. The Lithgow Council Land Fill Site, situated on the site of the old Western Main Colliery at Blackmans Flat, was approved by Lithgow City Council under Part 4 of the Act in the year 2005. An access ramp has recently been put in place as part of the construction works required for the landfill site, however further works are yet to commence. The approximate distance from the closest residence at Blackmans Flat to this new landfill site is approximately 500 metres.

The Mount Piper Ash Placement Project, a development proposed but yet to be approved, is to be located in close proximity to Blackmans Flat. The Mount Piper Ash Placement Project, comprising development of four new ash storage areas to accommodate the ash generated by the existing Mount Piper Power Station Units 1 and 2 (and for the proposed Mount Piper Power Station Units 3 and 4, should the coal-option be selected), located approximately 750 metres from Blackmans Flat. The Proponent, Delta Electricity, has recently lodged a major project application with the Department and the Director-General's requirements for the proposal were issued on 12 November 2009. The Department notes that these requirements identified human amenity impacts (including dust) as a key issue that must be addressed in the Environmental Assessment.

The Department notes that Delta Electricity is currently undertaking its assessment for the Mount Piper Ash Placement Project and the Department is yet to receive the Environmental Assessment for the said project. The Department notes that the management of ash would be considered in this separate application. However, as Delta Electricity partly justifies the Mount Piper Ash Placement Project on the basis that it would cater for the storage of ash generated by the Mount Piper Power Station Extension (under the coal-fired preferred option), the Department finds it would be appropriate to consider the potential cumulative amenity impacts that may result from the operation of all existing and proposed developments, including those relevant to the potential management of ash to be generated.

Submissions

Five submissions received from the public stated concerns regarding the management of ash generated from the project, under the coal-fuelled option. Two submissions questioned the make-up and management of ash and stated that this information should be disclosed to the public. Three submissions stated that adequate separation distances and buffer zones are important between sensitive uses and power stations, flyash and brine dumps. They also stated that current buffers and separation distances from Blackmans Flat residents are not adequate to avoid health impacts from the ash. They further state that the Environmental Assessment falsely claims that this proposal is 3km from Blackmans Flat - the township is just 2km from the existing stack. As a result, the Blackmans Flat residents are far too close to ash/waste disposal (and susceptible to traffic, noise and dust impacts).

Consideration

If all of the above developments are operational (existing and proposed), with the project's coal-fired option, the Department considers that there is potential for elevated amenity impacts on the residents of Blackmans Flat which could be excessive. This is due to the increased potential for the residents of Blackmans Flat to experience human amenity impacts caused by traffic, noise and, in particular, dust generation, as a result of the carrying out of the above activities. The management of waste produced by the burning of coal is considered to be a key factor in adding to cumulative amenity impacts.

Should the Proponent seek project approval from the Minister for the coal-fired option of this Project, the main by-product to be produced from the operation of the coal-fired power plant will be flyash, small solid particles of ash and soot generated when coal is burnt. It is suspended in the flue gas after combustion. The handling of this generated ash will be similar to the current ash management system in place for the existing Mount Piper Power Station facility. For the existing Mount Piper Power Station, a fabric filter system is in place within the power station structure, as this power station is fuelled by coal. This fabric filter system captures over 99.9 per cent of flyash generated from the existing operations, which is then conditioned with water or wastewater to give a 15 percent moisture content to facilitate its handling and to prevent dust generation. This conditioned ash is currently stored in the former Western Main open cut mine void, adjacent to the power station (known as Disposal Area 1). Disposal Area 1 has accommodated dry ash placement since the existing power station was commissioned in 1992-1993. Delta Electricity has predicted that Disposal Area 1 will reach full capacity in five to

six years time (i.e. by the year 2015), which is well before the existing power station reaches the end of its economic life. For this reason, Delta Electricity has lodged a separate major project application with the Department to cater for the ash generated from the existing Mount Piper Power Station after the year 2015, and for this Project (should the Proponent seek project approval for the coal-fired option in the future).

While this separate assessment and approvals process is acknowledged, the Department considers that, given the distance (approximately 750 metres) between the closest sensitive receptors to the Mount Piper Ash Placement Project and to the existing developments, ash disposal has the potential to cause elevated cumulative amenity impacts to the residents of Blackmans Flat if not comprehensively mitigated and managed by the Proponent. These matters will be considered in more detail as part of the assessment process for the ash disposal project and addressed accordingly.

In the context of a future project application for the power station proposal, the Department considers that assessment of cumulative impacts as part of that assessment will be of fundamental importance. For this reason, the Department has recommended that the Proponent be required to provide an assessment of the cumulative impacts on residential receptors of Blackmans Flat from ash placement activities. The Department finds that this further assessment requirement will ensure that the cumulative amenity impacts at Blackmans Flat can be further assessed to ascertain whether the levels of impacts meet the acceptable amenity thresholds. In the event that amenity impacts cannot be met at Blackmans Flat, the need for acquisition of properties would potentially need to be considered by Delta Electricity.

6. CONCLUSIONS AND RECOMMENDATIONS

The Department has assessed the Environmental Assessment, Statement of Commitments, submissions received and the Submissions Report, and is satisfied that the Project can be designed in a manner which mitigates or manages the predicted impacts, to ensure an acceptable level of environmental performance.

The key activity that has the potential to cause significant impact to the environment and amenity is the operation of the Project. The associated impacts are greenhouse gas emissions, impacts to air quality, noise impacts, water management and cumulative amenity impacts.

Operation of the proposal is predicted to generate in the vicinity of 10.8 and 13.1 million tonnes $CO_{2\text{-}e}$ per year from the coal-fired option, and 7 and 7.2 million tonnes $CO_{2\text{-}e}$ per year with the gas-fired option. It is noted, however, that additional detail will be required as part of a project application to confirm these levels and as such the Department has recommended conditions of approval to this effect. Considering the need for the Project and the potential greenhouse gas impacts, the Department has recommended for this stage of concept approval, a number of conditions which require the Proponent to clearly demonstrate that best practice technology is to be implemented to minimise greenhouse gas emissions, and to demonstrate that they are investigating carbon reduction technologies that could be feasibly retrofitted to the plant, as well as other emission reduction or offset measures, to reduce or offset greenhouse gas emissions.

The Department has also recommended the Proponent prepare an updated air quality assessment. Although the Department finds that the pollutants NO_2 and SO_2 have the potential to cause exceedances of the criteria, it considers that the maximum predicted contributions from the Project are acceptable in concept. The highest pollutant levels would be close to the Project facility (i.e. within 2 km) and no exceedances of the criterion would occur at any sensitive receptor location. The Department notes that the Proponent has committed to select and maintain plant equipment in a manner that ensures pollutant concentrations will meet the air quality criteria.

The Department has also recommended that the Proponent prepare an updated noise assessment, in accordance with nominated guidelines. The Department has also recommended that the Proponent prepare a comprehensive cumulative noise amenity assessment of existing developments, approved developments and the Project, relative to the nearest sensitive receivers.

As it is unclear whether or not the existing Mount Piper Power Station water treatment facilities can accommodate the flow of water from the proposal, the Department has recommended a condition that requires the Proponent to prepare a Water Cycle Balance, which demonstrates the viability of the plant in relation to existing water entitlements identified for use by the plant, and that adequate water supply is available for the operation of the plant. The Department has also recommended a condition that requires the Proponent to detail, as part of the Water Cycle Balance, the management measures proposed during both construction and operation to ensure the project will achieve a neutral or beneficial effect on water quality. There is however potential for this availability to be at risk under drought conditions. For this reason, the Department recommends a condition that requires the Proponent to develop a Water Supply Contingency Plan to address water supply having regard to the water allocation under the current licences and agreements. This Plan would need to take address ongoing operation of the Project in periods of drought.

Blackmans Flat, a group of approximately 19 houses, is located 2,800 metres from the proposed power station site. The Department has found that detailed evaluation of the cumulative impacts at Blackmans Flat must be undertaken as part of the Department's further consideration of the Project under the coal-fired preferred option, should the Proponent lodge a project application for this option. For this reason, the Department has recommended the Proponent be required to provide an assessment of the cumulative impacts on residential receptors of Blackmans Flat from ash placement activities. The Department finds that this further assessment requirement will ensure that the cumulative amenity impacts at Blackmans Flat can be further assessed to ascertain whether the levels of impacts meet the acceptable amenity thresholds.

The Department recommends that the Minister for Planning consider the findings and recommendations of this Report and approve the concept plan, subject to the recommended conditions.

7. REFERENCES

AEMO (2009), *Electricity Statement of Opportunities for the National Electricity Market*, AEMO, Australia, 2009

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APPENDIX A – RECOMMENDED CONDITIONS OF APPROVAL

APPENDIX B – STATEMENT OF COMMITMENTS

APPENDIX C – SUBMISSIONS REPORT

APPENDIX D – ENVIRONMENTAL ASSESSMENT

APPENDIX E – INDEPENDENT REVIEWS