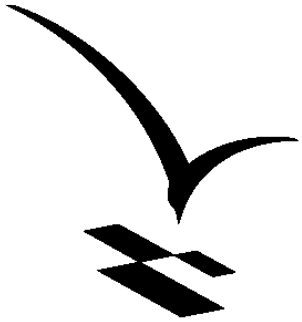

Department of
Urban Affairs and Planning

# REPORT ON THE ASSESSMENT OF DEVELOPMENT APPLICATION NO. 71-04-01 PURSUANT TO SECTION 80 OF THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979

# PROPOSAL BY STERLING PULP CHEMICALS LTD TO CONSTRUCT AND OPERATE A SODIUM CHLORATE PRODUCTION FACILITY IN THE MACQUARIE GENERATION INDUSTRIAL DEVELOPMENT STRATEGY AREA, MUSWELLBROOK LOCAL GOVERNMENT AREA

**Department of Urban Affairs and Planning**

**November 2001**

## EXECUTIVE SUMMARY

On 17 April 2001, the Department of Urban Affairs and Planning received a development application from Sterling Pulp Chemicals Ltd (the Applicant) for the construction and operation of a sodium chlorate plant. The Applicant proposes to produce up to 60,000 tonnes per annum of sodium chlorate, primarily for use in the paper industry as a feed material in the bleaching process. The development site lies within the Macquarie Generation Industrial Development Strategy (MGIDS) area, near the Bayswater Power Station, in the Muswellbrook local government area.

The proposal is a development to which *State Environmental Planning Policy No. 67 - Macquarie Generation Industrial Development Strategy* (SEPP 67) applies as it is an appropriate energy-intensive industry listed in a Schedule to the SEPP. This makes the proposal permissible with consent. The SEPP also make the proposal State Significant Development, and as such the Minister for Urban Affairs is the consent authority.

The proposal is also a development to which *State Environmental Planning Policy No. 34 - Major Employment-Generating Industrial Development* applies as it will involve a capital expenditure of $95 million (in excess of the threshold $20 million). This also makes the proposal State Significant Development. In addition to the benefits of capital investment, the proposal will generate 35 full-time employment positions and 120 jobs during construction.

The proposal is designated development and an Environmental Impact Statement was lodged with the development application. It is also integrated development as it requires licences from the Environment Protection Authority (EPA) under the *Protection of the Environment Operations Act 1997* and from the Department of Land and Water Conservation under the *Water Act 1912*. The EPA and DLWC have issued General Terms of Approval for the proposal, which have been incorporated into the recommended instrument of consent.

The subject development application and Environmental Impact Statement were placed on public exhibition from 30 April 2001 until 30 May 2001. A total of 16 submissions were received by the Department in response to the exhibition, including 6 from authorities, 1 from a council and 9 from individuals or groups. None of the submissions received from authorities raised objection to the proposal. The council has stated support for the proposed development and supplied recommended conditions of consent. All submissions received from members of the public stated objection to the proposed development. Major issues of concern raised in public submissions included air quality impacts (including cumulative and health impacts), cumulative traffic impacts, water quality impacts and hazards and risk impacts.

Through its environmental impact assessment of the proposal, the Department established that significant environmental issues included air quality impacts, hazards and risk impacts and water quality impacts. Although these impacts were identified as being of concern to the public and having potential for significant impacts, the Department considers that appropriate measures can be put in place to mitigate these impacts to acceptable level.

The Department recommends approval of the proposed development, subject to conditions. It is considered that the conditions of the recommended instrument of consent impose appropriate measures to ensure environmental impacts are mitigated, managed and monitored.

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## 1. INTRODUCTION

On 17 April 2001, the Department received a development application from Sterling Pulp Chemicals Ltd for the construction and operation of a sodium chlorate plant. The development is proposed for a site within the Macquarie Generation Industrial Development Strategy (MGIDS) area, near the Bayswater Power Station in the Muswellbrook local government area.

This report represents the Department's assessment of the proposed development, in accordance with the *Environmental Planning and Assessment Act 1979*. The Department recommends approval of the subject development application.

## 2. DEVELOPMENT PROPOSAL

The proposed development will produce up to 60,000 tonnes per annum of sodium chlorate. There is potential for the development to expand in future to produce an additional 40,000 tonnes per annum (subject to a separate assessment and approvals process).

The primary application for sodium chlorate is as a feed material for the generation of chlorine dioxide. Chlorine dioxide is an alternative bleaching medium to traditional chlorine bleaching in the paper industry. Chlorine dioxide is an elemental chlorine-free bleaching medium that reduces the levels of compounds such as dioxins produced during paper bleaching.

The main components of the proposed sodium chlorate plant are:

- the main plant building;
- a parking area;
- a bunded tank farm;
- a cooling tower and chiller;
- a substation transformer and rectifier; and
- product storage, feed material unloading and product loading areas.

The main plant building will house the process components of the development, including:

- brine production and purification area;
- electrolytic cell system;
- crystalliser and drying area;
- bulker bag filling and loading facilties;
- maintenance room;
- control room;
- offices;
- utility equipment (air compressor, motor generator, water softener etc);
- dry chemical storage areas; and
- motor control centre.

The proposed sodium chlorate will be similar to plants operated by the Applicant in Canada and the United States of America. A picture of the Applicant's plant in Valdosta, Georgia (USA) is provided as Figure 1.

### 2.1 Process Description

Sodium chlorate ($NaClO_3$) is produced from sodium chloride (NaCl) through an electrolytic process. The overall reaction is as follows:

$$NaCl\left(aq\right) + 3H_2O\left(l\right) \quad \Leftrightarrow \quad NaClO_3\left(aq\right) + 3H_2\left(g\right)$$

**Figure 1 - The Applicant's Sodium Chlorate Plant in Valdosta, Georgia (USA)**

Thermodynamically, the reagents in the above reaction (NaCl and $H_2O$) are in a lower energy state than the products ($NaClO_3$ and $H_2$). The conversion of sodium chloride to sodium chlorate under normal conditions is therefore not a favourable reaction (systems tend to a state of lowest overall energy). In order to "force" the reaction to proceed in a thermodynamically unfavourable direction, energy must be added to the reaction system. The energy utilised in the proposed sodium chlorate plant will be in the form of an electrical current applied across an electrolytic cell. This process is analogous to the operation of a battery in reverse (ie application of energy to cause a chemical reaction, rather than a chemical reaction generating an electrical current).

The process to be employed at the proposed development can be divided into four areas:

- brine preparation and purification;
- electrolysis;
- crystallisation and drying; and
- product handling.

Each of these areas is briefly described below. A flow diagram depicting the production process is reproduced from the Environmental Impact Statement as Figure 3.

**Brine Preparation and Purification**

Sodium chloride (common table salt, NaCl) is delivered to the site by truck for storage in an open hopper. On a periodic basis, sodium chloride is transferred to a separate tank via a screw conveyor and bucket elevator configuration. The sodium chloride is dissolved in batches, using both raw water and water recycled from within the plant, to form "brine". Brine is a saturated salt solution.

The sodium chloride used in the process contains natural impurities such as magnesium ($Mg^{2+}$), calcium ($Ca^{2+}$) and sulfate ($SO_4^{2-}$). If these impurities are not removed from the brine, they may deposit on the electrodes of the electrolytic cells or precipitate in the cells or pipework, reducing the efficiency of the process. The cations ($Mg^{2+}$, $Ca^{2+}$) are removed by dosing the brine with sodium hydroxide (NaOH) and sodium carbonate ($Na_2CO_3$) in the Brine Reactor. Magnesium and calcium react with these compounds in the Brine Reactor to form solid calcium carbonate ($CaCO_3$) and magnesium hydroxide ($Mg(OH)_2$). Solids formed through this reaction are referred to as "muds". The brine is clarified and filtered to remove the solids, which are sent to a mud tank for collection and disposal off-site. Sulfate is removed from the process by taking a bleed stream from the crystalliser (downstream of brine preparation) and dosing it with calcium chloride ($CaCl_2$) in the Sulfate Reactor. The sulfate precipitates as solid calcium sulfate ($CaSO_4$), which is sent to the same tank as brine treatment muds.

After a few years of operation, sodium perchlorate ($NaClO_4$) will also tend to build up in the process, at which time dosing of potassium chloride (KCl) into the Sulfate Reactor will commence to precipitate potassium perchlorate ($KClO_4$) with the sulfate muds.

**Electrolysis**

After purification, brine will be directed to a Cell Surge Tank to balance the flow of brine before it enters the electrolytic cells (Cell Line Reactors). Sodium dichromate ($Na_2Cr_2O_7$) is added to the brine as both a catalyst and a corrosion inhibitor. The brine is then directed to a series of 110 electrolytic cells where a current is applied. Within the cell, chloride ions ($Cl^-$) are converted to chlorine gas ($Cl_2$) at the anode and hydroxide ions ($OH^-$) are formed from water at the cathode. Chlorine gas and hydroxide ions react to form sodium hypochlorite (NaClO). In the presence of the sodium dichromate catalyst, the sodium hypochlorite reacts further with water to produce sodium chlorate ($NaClO_3$) and hydrogen gas ($H_2$). The electrical energy requirement of this process under stable operating conditions is approximately 5,500 kWh per tonne of sodium chlorate produced.

**Figure 2 - Process Flow Diagram for the Proposed Development**

The electrolysis is not completely efficient, with a number of side reactions also occurring in the cells. These reactions lead to the production of oxygen ($O_2$) and chlorine ($Cl_2$) gas. Gas collected from the cells (mainly hydrogen, oxygen, chlorine and water vapour) is collected and scrubbed with a sodium hydroxide solution (NaOH). The scrubbing process removes most of the chlorine gas before the remaining gas is vented to atmosphere. The gas (containing a large proportion of $H_2$) may be sold to the Bayswater Power Station as a clean, renewable fuel source.

**Crystallisation and Drying**

The solution exiting the electrolytic cells contains the sodium chlorate product, as well as residual sodium chloride and hypochlorites. Hydrogen peroxide ($H_2O_2$) is added to the solution in a Dehypo tank to convert hypochlorites back into sodium chloride. Once hypochlorites are removed, the solution is passed through a Crystalliser to produce sodium chlorate crystals (conversion of sodium chlorate in solution to a solid form). Because sodium chlorate is in the highest concentration in the solution, it crystallises out of the solution first, leaving behind sodium chloride, sulfate, sodium dichromate, sodium perchlorate etc.

The sodium chlorate crystals are drawn from the Crystalliser in a slurry form and passed through a Centrifuge and Dryer to remove excess moisture. Air passed through dryer becomes contaminated with sodium chlorate particles and is therefore passed through a scrubber before discharge to atmosphere.

**Product Handling**

Dried sodium chlorate crystals are conveyed for temporary storage in a bin before dispatch. The crystals may be packed in one tonne Flexible Intermediate Bulk Containers (FIBC) for international transport. Alternatively, the crystals may be transported domestically in trucks. All loading and dispatch areas are ventilated with collected air passing through baghouses to remove sodium chlorate dust before discharge.

## 2.2 Proposed Development Site

The proposed development site covers approximately 8.3 hectares and lies one kilometre from the Bayswater Power Station in the Macquarie Generation Industrial Development Strategy (MGIDS) area. The MGIDS area is a "buffer area" surrounding the Bayswater and Liddell Power Stations in the Muswellbrook and Singleton local government areas. The proposed development site lies wholly within the Muswellbrook local government area.

The portion of the MGIDS area on which the sodium chlorate plant is proposed is a cleared, hardstand area. The site was formerly a lay-down area during the construction of the Bayswater Power Station. The proposed development site is depicted in Figure 3 and the Bayswater Power Station in Figure 4.

The MGIDS area is a 9,000 hectare "buffer zone" originally established to provide land into which the power stations could expand and to prevent encroachment of development that may lead to land use conflicts (eg residential development). Over the past six years the MGIDS area has been investigated as the potential location for appropriate energy-intensive industrial developments. These investigations led to the preparation of *State Environmental Planning Policy No. 67 - Macquarie Generation Industrial Development Strategy* (SEPP 67) in April 2001. SEPP 67 aims to provide a mechanism by which certain energy-intensive developments may be located close to the power stations. The SEPP provides that specific developments determined to be appropriate by the Minister for location in the MGIDS area are State Significant Development and permissible with consent. The SEPP applies to the entire MGIDS area and at present only applies to a sodium chlorate plant in that area. The Minister may add additional developments to the SEPP at a later date. A mini steel mill is proposed by Hunter Specialty Steels for development in the MGIDS area and will be added to SEPP 67 should the Minister consider it appropriate to do so. SEPP 67 is considered further in section 3.4 of this report.

**Figure 3 - The Proposed Development Site**

**Figure 4 - Bayswater Power Station**

# 3. STATUTORY PLANNING FRAMEWORK

## 3.1 Permissibility

The proposed development lies on land zoned 5(a) Special Uses "A" under the *Muswellbrook Local Environmental Plan 1985*. The Muswellbrook LEP provides that industry is prohibited in the 5(a) zone, and as such under the LEP alone the proposed sodium chlorate plant would not be permissible. However, *State Environmental Planning Policy No. 67 - Macquarie Generation Industrial Development Strategy* (SEPP 67) makes the development of a sodium chlorate plant on specified land in the vicinity of the Bayswater and Liddell Power Stations permissible with consent.

## 3.2 Minister's Role

*State Environmental Planning Policy No. 34 - Major Employment-Generating Industrial Development* (SEPP 34) applies to the proposed development (refer to section 3.4 of this report). In accordance with clause 8 of the Policy, the Minister is the consent authority for the development application. Further, clause 7 of *State Environmental Planning Policy No. 67 - Macquarie Generation Industrial Development Strategy* (SEP 67) makes the proposed sodium chlorate plant State significant development, for which the Minister is the consent authority in accordance with section 76A(9) of the Act.

## 3.3 Legislative Context

In accordance with the provisions of the *Environmental Planning and Assessment Act 1979* (the Act) and the *Environmental Planning and Assessment Regulation 2000* (the Regulation), the proposed development is designated development, integrated development and State Significant development.

**Designated Development**

The proposed sodium chlorate plant constitutes designated development, as provided by Schedule 3 of the *Environmental Planning and Assessment Regulation 2000*. Specifically, the proposed development is a:

> *chemical industry or works that manufactures or use more than 1,000 tonnes per year of substances classified (but other than as explosive, poisonous or radioactive) in the* Australian Dangerous Goods Code

Sodium chlorate is classified as a class 5.1 material (oxidising agent) under the *Dangerous Goods Code*, with the Applicant proposing to produce 60,000 tonnes per year of this compound.

As required for designated developments, an Environmental Impact Statement was prepared in accordance with Division 4, Part 6 and Schedule 2 of the Regulation. Specific requirements for the preparation of the EIS provided in the Director-General's Requirements (DGR's), issued on 14 November 2000, were also addressed.

In accordance with section 79(1) of the Act and Division 5, Part 6 of the Regulation (public participation for designated development), the development application and accompanying Environmental Impact Statement were publicly exhibited for at least 30 days. Exhibition of these documents was conducted from Monday 30 April 2001 until Wednesday 30 May 2001 at the following locations:

- Department of Urban Affairs and Planning Head Office, Sydney;
- Department of Urban Affairs and Planning Regional Officer, Newcastle;
- Newcastle City Council Chambers; and
- Nature Conservation Council, Sydney.

The sodium chlorate is proposed on land owned by Macquarie Generation around the Bayswater and Liddell Power Stations, which was originally established to act as a buffer area between the Power Stations and surrounding land uses. It is noted that the closest land not owned by Macquarie Generation is two kilometres from the proposed development site, with the closest residence being some five kilometres from the proposed site. As Macquarie

Generation provided landowner's consent for the lodgement of the subject development application, the Department considers that the requirement of the Act to notify landowners adjacent to the development site has been met.

Notification of the proposed development was placed in the newspapers listed below. As the proposed development is to be located close to the local government boundary between Muswellbrook and Singleton, the Department considered it prudent to advertise in the local newspapers for both of those areas. Advertisements were also placed in the *Newcastle Herald* as the proposal was considered to generate broader interest in the Newcastle-Hunter region.

- the *Muswellbrook Chronicle* on Friday 27 April 2001 and Friday 11 May 2001;
- the *Singleton Argus* on Friday 27 April 2001 and Friday 11 May 2001; and
- the *Newcastle Herald* on Friday 27 April 2001 and Friday 11 May 2001

The newspaper notifications provided details of the proposal, exhibition locations and dates, and information on how interested parties could make a submission. A notice providing the same information was also displayed on the proposed development site for the duration of the exhibition.

**Integrated Development**

The development proposal constitutes integrated development, as defined by section 91 of the *Environmental Planning and Assessment Act 1979*. In addition to development consent the sodium chlorate plant proposal requires an Environment Protection Licence (EPL) from the Environment Protection Authority under the *Protection of the Environment Operations Act, 1997*.

The EPA was consulted during the preparation of Director-General's requirements for the Environmental Impact Statement and notified of the lodgement of a development application for the proposal. Following the supply of copies of submissions in response to the exhibition of the development application, the EPA supplied comments and General Terms of Approval to the Department, which have been incorporated into this assessment report and the recommended instrument of consent. The EPA's provision of General Terms of Approval indicates the EPA's satisfaction that an EPL for the proposed sodium chlorate plant may be issued.

**State Significant Development**

The proposed sodium chlorate plant constitute State Significant development, as defined by section 76A(7) of the *Environmental Planning and Assessment Act, 1979*. The proposal is State Significant Development by virtue of the provisions of two separate environmental planning instruments:

- clause 8 of *State Environmental Planning Policy No. 34 - Major Employment-Generating Industrial Development* (refer to section 3.4); and
- clause 7 of *State Environmental Planning Policy No. 67 - Macquarie Generation Industrial Development Strategy* (refer to section 3.4);.

The Minister for Urban Affairs and Planning is the consent authority for State Significant Development.

## 3.4 Relevant Environmental Planning Instruments

The assessment of the proposed development is subject to the following environmental planning instruments:

- *State Environmental Planning Policy No. 34 - Major Employment-Generating Industrial Development*;
- *State Environmental Planning Policy No. 67 - Macquarie Generation Industrial Development Strategy*;
- *State Environmental Planning Policy No. 33 - Hazardous and Offensive Development*;

- *State Environmental Planning Policy No. 44 - Koala Habitat Protection*;
- *Hunter Regional Environmental Plan 1989*; and
- *Muswellbrook Local Environmental Plan 1985.*

Consideration of the proposed development in the context of the objectives and provisions of these environmental planning instruments is provided below.

**State Environmental Planning Policy No. 34**

On 20 November 2000, the Minister for Urban Affairs and Planning agreed that the proposed sodium chlorate plant is a development to which *State Environmental Planning Policy No. 34 - Major Employment-Generating Industrial Development* (SEPP 34) applies. This determination was based on:

- the development having an estimated capital investment value of $95 million (excluding land), which exceeds the $20 million threshold specified under paragraph (a)(ii) of Schedule 1 of the Policy; and
- the development is of a type listed under paragraph (b) of Schedule 1 of the Policy (ie chemical processing).

In accordance with Clause 8 of SEPP 34, the consent authority for this development is the Minister for Urban Affairs and Planning. A full consideration of the proposed development, in the context of the objectives and provisions of SEPP 34, is provided in Appendix A.

**State Environmental Planning Policy No. 67**

*State Environmental Planning Policy No. 67 - Macquarie Generation Industry Development Strategy* (SEPP 67) was gazetted on 12 April 2001. The SEPP aims to:

- promote and coordinate orderly and economic development of land in the MGIDS area;
- facilitate the carrying out of certain types of industrial development of State significance within the MGIDS area with a string commitment to sustainable environmental performance; and
- enable public involvement and participation in the assessment of applications for consent to carry out this development.

As noted in section 2.2 of this report, SEPP 67 applies to the proposed sodium chlorate plant. The SEPP makes the proposed development permissible with consent (refer to section 3.1 for details of permissibility issues) and State significant development.

The SEPP requires that a consent authority notify the relevant local council (Muswellbrook and/ or Singleton) of any development application to which the SEPP applies and take into consideration the views of the relevant councils when determining the application. The Department notified both Singleton and Muswellbrook Shire Councils of the proposed development and invited comment. The submission received from Muswellbrook Council has been duly considered in the assessment of the sodium chlorate plant. Comment was not received from Singleton Council.

SEPP 67 also required a consent authority to consider a number of matters as part of its assessment of a development application. These matters include cumulative air impacts, transport impacts, waste minimisation, visual amenity and, socio-economic impacts. Appendix A provides a consideration of these matters.

The Department considers that the requirements of SEPP 67 in relation to notification and assessment have been fully met.

**State Environmental Planning Policy No. 33**

*State Environmental Planning Policy No. 33 - Hazardous and Offensive Development* aims to identify proposed developments with the potential for significant off-site impacts, in terms of risk and/ or offence (odour, noise etc). A development is defined as potentially hazardous and/ or potentially offensive if, without mitigating measures in place, the development would have a significant risk and/ or offence impact on off-site receptors.

The proposed sodium chlorate plant is considered "potentially hazardous". In accordance with SEPP 33, the Applicant prepared a Preliminary Hazard Analysis for the proposal to demonstrate that proposed risk mitigation measures could adequately reduce off-site risk impacts to an acceptable level (ie. the sodium chlorate plant would not be "hazardous"). Consideration of hazards and risk impacts is considered in more detail in section 4.2 of this report.

The proposal is also considered "potentially offensive" as it requires an Environment Protection Licence (EPL) from the Environment Protection Authority (EPA). The EPA has issued General Terms of Approval for the proposed development, thereby indicating that it is prepared to issue the EPL. As such, the proposal does not constitute "offensive" development.

**State Environmental Planning Policy No. 44**

*State Environmental Planning Policy No. 44 - Koala Habitat Protection* was gazetted on 6 January 1995 to:

- encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas;
- ensure permanent free-living populations of koalas over their present range; and
- reverse the current trend of koala population decline.

To this end, a number of local government areas in which populations of koalas are known to reside is provided in Schedule 1 of SEPP 44. As the Muswellbrook local government area is included in the Schedule, the proposed sodium chlorate plant constitutes a development to which SEPP 44 applies.

The proposed development site is devoid of vegetation that could be considered appropriate to support koalas. However, land surrounding the development site, associated with the MGIDS area, does contain examples of *Eucalyptus tereticornis* (forest red gum), thereby making the area "potential koala habitat". The Applicant argues that the forest red gum trees in the area are generally scattered and do not provide a continuous canopy for feeding and breeding, thereby making the trees of little value to koalas. Further, the Applicant notes that the last siting of a koala in the area was in 1954. As such, the development site, and the surrounding MGIDS area is not considered "core koala habitat".

Having identified that the subject site is neither "potential koala habitat" nor "core koala habitat", all requirements of SEPP 44 have been fulfilled. Further consideration of impacts on flora and fauna is provided in section 4.7.

**Hunter Regional Environmental Plan 1989**

A number of provisions of the *Hunter Regional Environmental Plan 1989* apply to the proposed development. In particular, the Plan provides a series of aims and objectives related to industrial development, transport, pollution control and waste. The Department considers that the proposed sodium chlorate plant is generally consistent with the relevant aims and objectives of the Regional Plan. A full consideration of the relevant provisions is given in Appendix A.

**Muswellbrook Local Environmental Plan 1989**

Under the *Muswellbrook Local Environmental Plan 1985* (Muswellbrook LEP), the proposed sodium chlorate plant will be located on land zoned 5(a) - Special Uses "A" (Power Station). The LEP states that the only land uses that are permissible with consent in that zone are powers stations, coal conveyors and developments ancillary to power stations. As the proposed sodium chlorate plant constitutes none of those types of development, the LEP does not make it permissible with consent. The proposal is, however, permissible with consent in accordance with SEPP 67 (refer above).

The objective of the 5(a) zone is to "recognise existing public land uses and to enable their continued operation, growth, or expansion to accommodate associated, ancillary or otherwise related uses". In making SEPP 67, this objective was taken into consideration with the

conclusion drawn that organised industrial development in the MGIDS area would not be inconsistent with the objective of the 5(a) zone. The Department notes that the proposed location of the sodium chlorate plant does not unduly restrict the use of land in the MGIDS area, and therefore does not limit the current and future operations or expansion of the Bayswater and Liddell Power Stations. As such, both SEPP 67, and the proposed sodium chlorate plant considered in isolation, are generally not inconsistent with the LEP.

There are no other specific provisions of the Muswellbrook LEP relevant to the proposed development.

## 4. CONSIDERATION OF ENVIRONMENTAL ISSUES

The Department has reviewed the Environmental Impact Statement for the proposed development, and duly considered all submissions from the public, government authorities and councils. As a result, the Department has identified the following environmental issues associated with the proposal. The issues have been classified as being of significance, or high significance, depending upon the magnitude and extent of environmental impacts, and the responses of the public, authorities and councils with respect to the impacts. A full consideration of each of the issues listed is provided from section 4.1 to section 4.10 of this report.

Issues identified as being of **major significance**:

- air quality impacts;
- hazards and risk impacts; and
- water quality impacts.

Issues identified as being of **significance**:

- transport impacts; and
- impacts of waste production and management.

Other important issues associated with the proposed sodium chlorate plant are:

- socio-economic impacts;
- impacts on flora and fauna;
- impacts on visual amenity;
- noise impacts; and
- impacts on heritage items.

### 4.1 Air Quality Impacts

**Applicant's Position**

The Environmental Impact Statement indicates that direct emissions from the proposed development to the atmosphere will be limited due to the nature of the process. Of particular note is the lack of combustion processes associated with the sodium chlorate plant, thereby precluding the emission of gases such as sulfur and nitrogen oxides (which are commonly of environmental concern with industrial developments). Electrolysis performed as part of the sodium chlorate production process does however support side reactions that lead to the generation of compounds other than sodium chlorate. The Applicant indicates that major compounds generated through these side reactions are oxygen ($O_2$), hydrogen ($H_2$) and chlorine ($Cl_2$). There is also potential for hydrogen chloride (HCl) and sodium chlorate ($NaClO_3$) to be present in gaseous vent streams from the development. The EIS also suggests that chromium (as hexavalent chromium, $Cr^{6+}$) is found in sodium chlorate product (originating from the sodium dichromate added to the process as a corrosion inhibitor). As emissions of sodium chlorate dust from the proposed development would have the same composition as the sodium chlorate product, the Applicant suggests that chromium will also be present in dust emissions. From experience with its Valdosta plant (USA), the Applicant has estimated that the emission of chromium from the development would be 0.8 $mghr^{-1}$.

In relation to air emissions, the Applicant indicates that there are five points associated with the proposed sodium chlorate plant from which discharges to the atmosphere are to occur:

- **vent scrubber** - gases from process tanks are collected and scrubbed with sodium hydroxide (NaOH) before discharge. Scrubbing is aimed at removing chlorine gas which is likely to be present in this stream;
- **tail gas scrubber** - gases collected from electrolysis operations are scrubbed with dilute sodium hydroxide to remove chlorine gas. Oxygen and hydrogen are also likely to be present in gases collected from the electrolytic cells;
- **chlorate dryer scrubber** - air is used to dry sodium chlorate crystals, during which crystals may become entrained in the drying air. This air stream is scrubbed to remove sodium chlorate before discharge to the atmosphere;
- **FIBC baghouse** - during loading of sodium chlorate product into bags, crystals of sodium chlorate may become entrained in the air. Ventilation of sodium chlorate loading areas is therefore passed through a baghouse to remove sodium chlorate before discharge;
- **Cyclone baghouse** - in a similar manner to loading bags, loading trucks may generate sodium chlorate crystals suspended in air. Ventilation from truck loading areas is passed through a baghouse to remove sodium chlorate before venting to atmosphere.

To establish the potential air quality impacts from the proposed development on surrounding land uses, the Applicant undertook dispersion modelling. The modelling focussed on the impacts of dust (sodium chlorate particles) from the chlorate dryer scrubber, the FIBC baghouse and the cyclone baghouse. The emission of chlorine and hydrogen chloride was modelled from the tail gas scrubber and vent scrubber. Input data for the modelling was obtained from meteorological and air quality monitoring undertaken for mining and electricity generation in the Upper Hunter. Emissions data for each of the discharge points was based on monitoring data the Applicant had collected from its operating sodium chlorate plant in Grande Prairie (Alberta, Canada).

Results of dispersion modelling indicate that the peak annual average concentration of total suspended particulates (TSP) attributable to the proposed sodium chlorate plant will be 2.11$\mu gm^{-3}$. The EIS highlights that this concentration compares favourably with NHMRC goal of 90 $\mu gm^{-3}$. However, the EIS also indicates that local air quality is currently degraded with respect to suspended particulates. Of note is monitoring data from the Ravensworth area (immediately to the south-east of the MGIDS area), which indicates that the local average annual TSP concentration in 1999 was 74.0 $\mu gm^{-3}$ and the local maximum annual TSP concentration was 153.0 $\mu gm^{-3}$. The same monitoring data indicates that a TSP concentration of 90 $\mu gm^{-3}$ was equalled or exceeded during nine months in 1999. Similarly, dispersion modelling for $PM_{10}$ (those particulates with an aerodynamic diameter of less than 10 $\mu m$) suggests that the peak annual average $PM_{10}$ concentration resulting from the operation of the proposal would be 1.29 $\mu gm^{-3}$. This figure compares favourably with the NSW EPA goal of 30$\mu m^{-3}$. As with TSP, $PM_{10}$ concentrations in the area are currently responsible for degraded air quality, with Ravensworth recording an average of 27.8 $\mu gm^{-3}$ and a maximum of 58.0 $\mu gm^{-3}$ during 1999.

The rate of dust deposition (as TSP comprising only $NaClO_3$) attributable to the proposed sodium chlorate was modelled by the Applicant to be 0.19 $gm^{-2}$ per month, which is well below the NSW EPA goal of 4 $gm^{-2}$ per month. The EIS presents data from dust gauges in the Ravensworth area that indicate an existing dust deposition rate ranging from 2.8 $gm^{-2}$ per month to 4.4 $gm^{-2}$ per month. The Applicant installed dust deposition monitoring points on the proposed development site for the four-month period preceding the lodgement of the subject development application. Data from these monitoring points indicate dust deposition on the site ranging from 1.7 $gm^{-2}$ per month to 3.4 $gm^{-2}$ per month.

The emission of chlorine was originally modelled for the EIS based on chlorine emission rates from the tail gas scrubber and the vent gas scrubber of 0.01425 $gs^{-1}$ and 0.0037 $gs^{-1}$ respectively. The results of that modelling indicated that the Victorian EPA 3-minute chlorine concentration criterion (NSW draft criterion) of 0.1 $mgm^{-3}$ could be met. During the assessment of the proposed sodium chlorate plant, the Applicant brought to the attention of the Department and the EPA that incorrect chlorine emission rates had been used for the modelling. Consequently, additional modelling was performed by the Applicant, using the

correct values of 0.05825 $gs^{-1}$ and 0.03105 $gs^{-1}$ for the tail gas scrubber and vent gas scrubber, respectively. Based on the revised modelling, the Applicant was able to demonstrate that it could operate the proposed development without exceeding the 0.1 $mgm^{-3}$ three-minute chlorine concentration criterion. The maximum chlorine concentration (outside the proposed development site) predicted by the revised modelling is approximately 0.06 $mgm^{-3}$.

A maximum 3-minute average concentration of 0.004 $mgm^{-3}$ for hydrogen chloride is presented in the EIS. The Applicant highlights that this concentration is well below the Victorian EPA criterion of 0.2 $mgm^{-3}$.

The Applicant notes in the EIS that the proposed development will also have an indirect impact on air quality though the consumption of electricity. Based on current emission rates per unit of electrical power generated from the Bayswater Power Station, and the expected power consumption rate of the sodium chlorate plant, the Applicant has estimated indirect air emissions due to electricity consumption. The Applicant suggests that the following emissions from the Bayswater Power Station will be attributable to the proposed development:

- 1,633 tonnes per annum of $SO_2$;
- 715 tonnes per annum of $NO_x$;
- 17.5 tonnes per annum of fluoride;
- 5.26 tonnes per annum of particulates; and
- 320,125 tonnes per annum of $CO_2$.

The Applicant recognises that it will be responsible for an increase in emissions from the Power Station. However, the Applicant highlights that the increase in emissions attributable to sodium chlorate plant will be minimal compared with existing emissions from the Power Station and will actually be less than the daily fluctuations in emissions between periods of maximum and minimum power generation.

**Issues Raised in Submissions**

The Environment Protection Authority provided a series of General Terms of Approval related to air quality impacts. Specifically, emission limits were supplied by the EPA for solid particulates, chlorine and hydrogen chloride, based on the dispersion modelling and emission rates provided by the Applicant. The General Terms also require monitoring of those pollutants and discharge parameters (temperature, flowrate etc) to verify that the discharge limits imposed are being met. The Applicant is also required to monitor meteorological conditions and the health of vegetation in the vicinity of the proposed development. Vegetation monitoring is intended to identify impacts from sodium chlorate dust deposition (eg chlorosis, defoliation etc).

Muswellbrook Shire Council, in its submission to the Department, requested that any consent include a plan to monitor air quality impacts and provide rehabilitation mechanisms where appropriate.

Air quality was the single greatest issue raised in submissions received from private individuals and groups. Of the nine submissions from private individuals and groups, seven raised air quality impacts as being of significant concern. Specific air quality issues are summarised below:

- general concern was raised in relation to the cumulative air quality impacts of the proposed development, given existing power station and coal mine developments in the area. Although existing developments are not considered to be emitting key compounds such as sodium chlorate, chlorine and hydrogen chloride, submissions highlight that the synergistic effects of these compounds combined or reacted with other air pollutants are of concern;
- health impacts that may result from air emissions from the proposed development, including those associated with sodium chlorate, chlorine, hydrogen chloride, dioxins and chromium species. Reference was made in a number of submissions to an article in the

*Singleton Argus* on 22 May 2001 that suggested the Upper Hunter was a "cancer hot spot";

- a number of private submissions quoted findings from a CSIRO study in 1996 into corrosion rates in the Upper Hunter. The study notes a higher incidence of corrosion in a long area centred on the Bayswater and Liddell Power Stations (50% higher than surrounding areas, but low compared with corrosion rates on the coast). Deposition of sodium chlorate dust is considered to be a potential contributing factor to increased regional corrosion rates;
- emission of compounds associated with the greenhouse effect and photo-chemical smog ($SO_x$, $NO_x$, CO, $CO_2$ etc) were raised as an issue of concern;

**Department's Position**

The Department generally concurs with the assessment of air quality impacts presented in the Environmental Impact Statement. It is noted that air dispersion modelling undertaken by the Applicant has demonstrated that the EPA's criteria for particulates, chlorine and hydrogen chloride can be met. Based on this modelling, the EPA has issued General Terms of Approval that specify emission limits for those air pollutants. The General Terms have been incorporated into the recommended instrument of approval (condition 3.6). In addition, the Applicant is required to monitor air pollutant emissions from the proposed sodium chlorate to confirm the on-going accuracy of dispersion modelling results as presented in the Environmental Impact Statement (conditions 4.2 to 4.5 inclusive).

A submission received from a member of the public questions the validity of the air dispersion modelling as it was based on data from a similar foreign developments. The Department notes that emission rates are a function of technology employed and are independent of the location of the technology. The dispersion modelling took into account meteorology characteristic of the Upper Hunter. Consequently the Department is satisfied that the dispersion modelling is valid and relevant to the proposed development in its proposed location.

***Dust***

The Department notes that the EIS did not provide any substantial consideration of dust emissions during the construction of the proposed development. However, the framework for a Construction Environmental Management Plan supplied by the Applicant indicates that a number of dust mitigating measures. These measures include minimisation of disturbed areas, the implementation of an Erosion and Sediment Control Plan and site rehabilitation as soon as practical after soil disturbance. Given that the site is an existing hardstand area, the Department recognises that the requirement to disturb soil (for site levelling etc) will be minimal, thereby minimising the potential for generation of dust during construction. The recommended instrument of consent has been drafted to include a Construction Environmental Management Plan (condition 6.2), as proposed by the Applicant in the EIS, to ensure that appropriate dust minimisation measures are adequately implemented during construction.

In relation to operational dust emissions, the Department recognises that dust (suspended particulates) represents a significant air quality issue for the Upper Hunter. The existing environment receives particulate emissions from power stations, agriculture and mining operations, and was indicated in the EIS, existing particulate concentrations (both TSP and $PM_{10}$) exceed relevant air quality criteria on occasion. Monitoring data from Ravensworth suggests that during 1999, maximum recorded TSP concentrations equalled or exceeded the 90 $\mu gm^{-3}$ annual average goal during a total of nine months. Similarly, $PM_{10}$ concentrations equalled or exceeded the 30 $\mu gm^{-3}$ annual average goal in a total of ten months.

Given the existing particulate situation, the Department considers it of very high importance to ensure that the proposed development does not exacerbate current high particulate concentrations. The *Upper Hunter Cumulative Impact Study and Action Strategy* (DUAP 1997) lists particulates as being the most significant air quality issue for the Upper Hunter and notes an upward trend in particulate concentrations (mainly attributable to increased mining and decreased rainfall). The Study also notes that although particulates are currently an issue, dust emissions tend not to persist for any significant distance from the source and existing dust emissions generally do not pose a health risk, due to the coarse size of the dust.

There are, however, amenity and nuisance impacts associated with dust deposition, as noted in the Study.

The Department considers it unfortunate, in terms of community perception and interpretation, that the Environmental Impact Statement tends to focus on the maximum ground-level concentrations of dust generated by the proposal. While this is an important to demonstrate that the EPA's goals for solid particulates can be met, it drew the emphasis away from dust impacts on other land uses. It is noted from the EIS that the maximum ground-level dust concentration (peak annual average TSP of 2.11 $\mu gm^{-3}$) occurs very close to the proposed development site. However, closer reference to dust concentration contours generated from the dispersion modelling tends to support a conclusion of limited persistence/ affectation, similar to that presented in the *Upper Hunter Cumulative Impact Study and Action Strategy* for coal mining operations. That is, dust concentrations (annual average TSP) predicted at the closest MGIDS area boundary are in the range 0.05 $\mu gm^{-3}$ to 0.1 $\mu gm^{-3}$. The Department considers that this concentration range is negligible compared with the annual average goal of 90 $\mu gm^{-3}$ and that it is unlikely that a discernible difference in particulate concentrations would be experienced at the MGIDS area boundary as a result of the operation of the proposed development. Further, it is noted that the MGIDS boundary is approximately two kilometres from the development site at the closest point. Considering that the closest residential land use is approximately five kilometres from the development site, dust impacts on existing and potential future human receptors (given current land use zonings) is negligible. The Department concludes that the Applicant has adequately demonstrated that dust emissions from the proposal will not exacerbate the dust pollution issue, as established through the *Upper Hunter Cumulative Impact Study and Action Strategy*.

Similarly for dust deposition rates, the maximum dust deposition predicted in the EIS (annual average of 0.19 $gm^{-2}$ per month) is a near-field phenomenon. At the nearest MGIDS area boundary dust deposition rates are more likely to be in the range 0.01 $gm^{-2}$ per month to 0.02 $gm^{-2}$ per month. This compares favourably with a goal of 4 $gm^{-2}$ per month, and the Department considers that the proposed sodium chlorate plant will not generate a noticeable difference in existing deposition rates (even noting that existing rates may lie close to or exceed relevant criteria). This conclusion is even more marked at the closest residential areas, some five kilometres from the development site. The Department considers that given the predicted dust deposition rates, dust settling on surrounding land uses is unlikely to have a nuisance or amenity impact.

The recommended instrument of consent makes specific reference to particulate emission rates required by the EPA through its General Terms of Approval (condition 3.6). These emission rates are based on input data for the Applicant's dispersion modelling as presented in the EIS. The Department is satisfied that compliance with these limits will constrain dust impacts to those presented in the EIS (which, as noted above, are considered to be negligible). Further, the recommended instrument of consent includes General Terms from the EPA that require monitoring of particulate emissions and dust deposition rates at monitoring points to be established in the vicinity of the proposed development. Data obtained from this monitoring is considered to be an effective means of confirming dispersion modelling presented in the EIS. Should on-going monitoring indicate consistent compliance with particulate emission and deposition rates, the recommended instrument provides a mechanism by which the Applicant may seek the Director-General's approval to alter the frequency of, or discontinue, particulate monitoring (with the agreement of the EPA).

The Applicant is also required to prepare, as a result of a General Term of Approval incorporated into the recommended instrument of consent, a Vegetation Monitoring Program (condition 4.6). It is recognised that sodium chlorate dust may lead to defoliation of some flora species, or may have other noticeable impacts such as chlorosis, mottling and stunted growth. By monitoring the health of vegetation in the vicinity of the development site, an early-warning mechanism may be established to recognise if sodium chlorate dust may be having a significant impact on surrounding land.

***Gaseous Emissions***

The Department is satisfied that the dispersion modelling presented in the EIS adequately demonstrates that the proposed development can meet relevant air quality criteria for chlorine and hydrogen chloride.

As with the consideration of dust impacts above, it is noted that the EIS focuses on maximum ground level concentrations of chlorine and hydrogen chloride. These maxima are predicted to occur close to the development site. However, concentrations at the MGIDS area boundary are predicted to be significantly lower than the maxima. Chlorine concentrations at the boundary are estimated to be in the order of 0.001 $mgm^{-3}$, compared with a maximum of 0.06 $mgm^{-3}$ (limit criterion of 0.1 $mgm^{-3}$). Similarly hydrogen chloride at the MGIDS area boundary is modelled to be 0.0002 $mgm^{-3}$, which is significantly lower than the maximum of 0.004 $mgm^{-3}$ (limit criterion of 0.02 $mgm^{-3}$). This consideration demonstrates that not only will the proposed development meet relevant air quality criteria, it will also produce chlorine and hydrogen chlorine concentrations at the MGIDS area boundary significantly below those criteria. Further, as the nearest residential areas are some five kilometres from the development site, chlorine and hydrogen chloride emissions will be further dispersed before reaching those receptors.

The Department considers that the impacts of gaseous emissions from the sodium chlorate plant will be minimal. The recommended instrument of consent includes General Terms of Approval from the EPA that impose emission limits for chlorine and hydrogen chloride (condition 3.6), and require on-going monitoring for those compounds (conditions 4.2 to 4.5 inclusive).

***Corrosion Impacts***

The majority of submissions received from private individuals and groups made reference to a CSIRO study (1996) into the incidence of enhanced corrosion in the Upper Hunter. In all cases the submissions stated that the study found corrosion rates to be "50% higher than normal" and that sodium chlorate dust would further exacerbate the problem.

Only one submission actually fully quoted the findings of the study, noting that the study found that an area in the Upper Hunter experienced a 50% higher rate of corrosion than surrounding areas, but the corrosion rate was low compared with corrosion rates on the coast. The submission states that the study concluded that enhanced corrosion rates seemed to be due to the presence of power stations in the area (as a result of air emissions). Given this observation, the Department considers that the most likely, and probably most significant, contributor to corrosion in the Upper Hunter is the action of sulfur dioxide and the formation of acid rain. The proposed sodium chlorate plant will not directly emit sulfur dioxide, but will consume energy from the Bayswater Power Station, which will emit more sulfur dioxide as a result (refer to consideration of energy consumption below).

Despite the results of the CSIRO study, the Department recognises that the potential for increased corrosion rates is an issue of significant community concern. As such the Department has considered the potential for sodium chlorate dust corrosion of metals with a conservative theoretical calculation. The calculation assumes:

- a worst-case sodium chlorate deposition rate of 0.02 $gm^{-2}$ per month at the boundary of the MGIDS area, as determined by dispersion modelling performed by the Applicant (equivalent to $1.886 \times 10^{-4}$ $molm^{-2}$ per month);
- sodium chlorate is deposited on pure iron (with no protection provided by paint or zinc in galvanised steel, for example);
- iron undergoes oxidation to ferrous form (divalent) rather than ferric form (trivalent), thereby considering a worst-case (more ferrous form would be generated from a mole of electrons than would be the case if oxidising to ferric form). This assumption also allows translation to other divalent metal ions (eg $Cu^{2+}$, $Pb^{2+}$, $Zn^{2+}$ etc), should these metals be susceptible to corrosion by chlorate ions;
- chlorate half reaction provides maximum number of electrons (six), representing a worst-case. Other half reactions with fewer electrons donated may be possible, but does not represent a maximum corrosion case;
- ignore thermodynamic restrictions. In reality, thermodynamics and mass transfer restrictions would reduce the rate of corrosion;

- ignore side reactions. In reality side reactions would likely reduce the rate of corrosion.

Considering the half-reactions below, it can be seen that stoichiometrically, one mole of chlorate (accepting 6 moles of electrons) may lead to the corrosion of three moles of iron (generating two moles of electrons per mole of iron corroded).

$$3Fe \Leftrightarrow 3Fe^{2+} + 6e^{-}$$
$$ClO_3^{-} + 3H_2O + 6e^{-} \Leftrightarrow Cl^{-} + 6OH^{-}$$

Therefore, considering the equations above, and a sodium chlorate deposition rate of 1.886 x $10^{-3}$ molm$^{-2}$ per month, one might estimate an iron corrosion rate of 5.659 x $10^{-4}$ molm$^{-2}$ per month. Given iron has a specific gravity of approximately 7.5 (density 143.3 mol m$^{-3}$), the rate of iron corrosion may be estimated at 4.2 x $10^{-6}$ metres per month (5.1 x $10^{-5}$ metres per year). At this rate it would take approximately 20 years for one millimetre of iron to corrode under the action of sodium chlorate dust from the proposed development.

The Department recognises that the above is a highly simplified, conservative calculation. In reality the corrosion chemistry would be considerably more complex. It is expected that in reality, the corrosion rate of a metal under the influence of deposited sodium chlorate would corrode more slowly than that indicated above because:

- dispersion modelling presented in the EIS (from which deposition data was obtained) was conservative. It is possible that the sodium chlorate deposition rate at the MGIDS area boundary may be lower than that predicted;
- sodium chlorate may react with other compounds in the environment, thereby reducing the actual dust load received at the MGIDS boundary;
- the calculation assumes constant deposition and corrosion, without dust being removed by rain; and
- corrosion would be inhibited by thermodynamics (activation energies, reactivities) and the build-up of corrosion products over time

Although simplified and conservative, the above calculation demonstrates that corrosion attributable to sodium chlorate dust deposition would be negligible at the MGIDS area boundary. Of note is the fact that the nearest residential area is some additional three kilometres away. Examination of the dust deposition contours presented in the EIS suggests that sodium chlorate deposition at the closest residential areas would be some 10 to 100 times lower than at the MGIDS area boundary. Proportionally, corrosion rates at that distance would be 10 to 100 times lower.

The Department does not consider it necessary to impose additional restrictions on the Applicant to mitigate corrosion impacts, other than sodium chlorate dust discharge limits.

***Health Impacts of Air Emissions***

The Department notes that little consideration of health impacts associated with the proposed development was provided in the Environmental Impact Statement. As a number of submissions were received raising potential health impacts as an issue of significant public concern, the Department considers is important to assess this matter in more detail. Compounds that may be emitted to the atmosphere from the proposed development and cause a health impact are sodium chlorate ($NaClO_3$), chlorine ($Cl_2$) and hydrogen chloride (HCl). It is noted that dispersion modelling has demonstrated that the EPA's goals for those compounds can be met by the development. Comment is made in the EIS in relation to chromium contamination of sodium chlorate crystals. This issue was not investigated further in the EIS.

Sodium chlorate is recognised as an irritant to skin, mucous membranes and eyes. Experimental evidence suggests that 500mg of sodium chlorate applied to the skin of a rabbit for a period of 24 hours produced no more than mild irritation effects. Based on dust deposition modelling, a human exposing 1m$^2$ of skin would have to be at the point of maximum dust deposition (0.19 gm$^{-2}$ per month) for at least two and a half months to receive a dose of 500mg of $NaClO_3$. The Department considers it reasonable to assume that a

human would not be located at the most affected point for that length of time and therefore not experience mild skin irritation effects. Similarly, testing on rabbits indicates that a dose of 10 mg of $NaClO_3$ causes mild irritation to the eye. Considering maximum dust deposition rates of 0.19 $gm^{-2}$ per month and ambient concentrations of 2.11 $\mu gm^{-3}$, the Department considers it highly unlikely that a member of the public would be exposed to sufficient $NaClO_3$ to cause eye irritation. Little data is available in relation to inhalation impacts, however, the Department considers that a worst-case scenario would be to assume that the respiratory tract is as sensitive as the eye. Based on this assumption, it is highly unlikely that respiratory irritation would be experience at the most affected point. It is further noted that only small particulates (of size $PM_{2.5}$) are likely to impact the respiratory tract as low as the lungs. This further reduces the $NaClO_3$ that could potentially affect the human lung in the event of inhalation. In relation to ingestion of sodium chlorate, a number of tests have been conducted which indicate that the lowest concentrations at which death has been known to occur include 700 mg/ kg (dog), 1350 mg/kg (cat) and 8000 mg/ kg (rabbit). The lowest recorded concentration causing death in a human by oral-route (female) is 800 mg/kg. Assuming a human body weight of 70 kg, approximately 56 g of $NaClO_3$ would need to ingested to cause death. Hypothetically, if produce was to be grown at the most affected point, without rain or other mitigating measures, the produce would have to been located at that point for approximately 24 years per square metre of produce surface area to receive sufficient $NaClO_3$ to constitute a lethal dose. Clearly this is unrealistic and therefore ingestion health impacts are negligible.

As indicated in the PHA for the proposed development, chlorine gas has a detectable odour at as little as 1 ppm. Between 5 and 15 ppm it is highly irritating to mucous membranes of the eyes and the respiratory tract. It is dangerous for short exposures at 50 ppm and lethal within seconds at 1000 ppm. Dispersion modelling presented in the EIS indicates that chlorine will be undetectable by humans under normal operating conditions. The worst-case chlorine release scenarios considered in the PHA s suggests that mild irritation and a detectable odour may be noticed by those close to the development. The Department supports the Applicant's observation that due to the highly irritating nature of chlorine, most people would move away from the area of affectation should irritating effects be noticed. Consequently it is considered that inhalation health impacts would be highly unlikely. The Department highlights that chlorine, being a gas, is unlikely to be ingested.

Hydrogen chloride elicits similar irritation responses to chlorine, affecting eyes, skin and mucous membranes. Experimental data suggests $LD_{50}$ values (the dose causing 50% kill rate) of 4701ppm for rats and 2644ppm for mice over a thirty minute period. Predicted maximum concentrations presented in the EIS for hydrogen chloride are well below these concentrations. The Department considers that the potential for hydrogen chloride from the proposed development to impact on human health is extremely low.

The Environmental Impact Statement notes that sodium chlorate dust discharged from the proposed development will contain chromium. However, the EIS fails to comment on the potential for the chromium to impact on the surrounding environment. The EPA's General Terms of Approval made no reference to chromium.

The EIS does indicate that discharge of chromium will be discharged at a rate of 0.8 $mgh^{-1}$ and that chromium is a contaminant in sodium chlorate crystals. The Department notes from air dispersion modelling presented in the EIS that sodium chlorate dust will be discharged from the proposed development at a rate of 0.1105 $gs^{-1}$ (combined discharges from FIBC baghouse, dryer scrubber and transport baghouse). It is assumed that chromium is homogenously distributed through sodium chlorate crystals (0.8 $mgh^{-1}$ of chromium is distributed through 397.8 $gh^{-1}$ of sodium chlorate). Chromium therefore constitutes 2 x $10^{-4}$ wt% of sodium chlorate discharged. From the results of the dispersion modelling presented in the EIS, the Department has calculated the following air concentrations of chromium:

**Table 1 - Chromium Impacts**

| Parameter | Modelling Results | Chromium Only |
|---|---|---|
| Maximum TSP ($\mu gm^{-3}$) | 2.11 | 4.2 x $10^{-4}$ |
| MGIDS Area Boundary TSP ($\mu gm^{-3}$) | 0.1 | 2.0 x $10^{-5}$ |

The Department notes that the US EPA recognises chromium ($Cr^{6+}$) represents an a health risk if inhaled in sufficient concentrations. The US EPA suggests that the inhalation unit risk for hexavalent chromium is $1.2 \times 10^{-2}$ $(\mu gm^{-3})^{-1}$. Based on the calculated chromium concentrations in the table above, this inhalation unit risk translates to a cancer risk from chromium at the MGIDS area boundary of $0.24 \times 10^{-6}$ per lifetime. This figure is well below the accepted lifetime cancer risk of $1.0 \times 10^{-6}$. It is noted that the risk at any point further removed from the development site than the MGIDS area boundary would experience an even lower risk.

At the point of highest TSP concentration, the lifetime cancer risk would be $5.09 \times 10^{-6}$. The point of highest predicted TSP (and hence $Cr^{6+}$) concentration is close to the development site, within the MGIDS area. It should be noted that the calculated cancer risk assumes that the affected human stands at the point in question for his/ her entire life. This is not feasible in reality as the MGIDS area is not directly accessible to the public, and employees likely to be working on the site would not be located there for every hour of their lives.

A number of submissions raise the issue of dioxins impacting on human health. The Department notes that dioxins are carbon-based compounds. As the proposed development will not involve processing or handling of carbonaceous material, the Department is satisfied that the emission of dioxins from the sodium chlorate plant is highly unlikely. With regard to the potential dioxins to be formed in the atmosphere, the Department notes that dioxins are most often associated with high temperature combustion operations, with carbon, oxygen and chlorine in specific concentration ranges and within defined pressure and temperature limits. This reinforces the fact that the formation of dioxins at normal atmospheric conditions is thermodynamically unfavourable. The Department does not consider that atmospheric dioxin formation is a realistic possibility.

Submissions also made reference to a *Singleton Argus* article of 22 May 2001, which suggests that the Hunter is a cancer hotspot with a melanoma rate above the State average. The Department has viewed and considered this article, concluding that the statements made in the article may not be particularly relevant to the proposed development. Firstly, the article refers to the Hunter region, rather than the "Upper Hunter". This is significant as the Hunter also incorporates the Newcastle, Lake Macquarie and Port Stephens areas. The second issue is that a melanoma is a malignant tumour derived from a pigment-containing cell (especially in the skin). Melanomas are often associate with sun exposure, a past-time common to coastal areas such as Newcastle, Lake Macquarie and Port Stephens. The Department does not consider that the findings referred to in the newspaper article are particularly relevant to the subject development application.

The Department is satisfied that the proposed development will not exert significant health impacts on surrounding land uses. No specific conditions related to the mitigation of health impacts has been included in the recommended instrument of consent, other than for air emission limits.

***Synergistic Effects***

A number of submissions received from members of the public highlighted that the EIS discounted cumulative air quality impacts as there are no existing developments in the Upper Hunter that emit compounds such as sodium chlorate, hydrogen chloride and chlorine. The submissions suggested that the Applicant had failed to consider synergistic effects of air emissions with other compounds in the regional airshed, and the possibility of atmospheric reaction to generate potentially more detrimental compounds. The Department notes that the EIS did not provide this type of consideration, but does not support the position stated in submissions that the environmental impacts assessment is thereby flawed.

As noted in the *Upper Hunter Cumulative Impact Study and Action Strategy*, synergistic effects are possible. The Study indicates that the primary mechanism for these effects in the existing airshed is the adsorption of compounds such as sulfur dioxide ($SO_2$) to particulate matter. Particles of aerodynamic diameter less than 2.5 $\mu$m ($PM_{2.5}$) can travel into the human lung, and should those particles be carrying compounds such as $SO_2$, irritation to the mucous

membranes within the lung may be augmented. To contribute to this mechanism of synergistic impacts, the proposed development would need to:

- contribute to particulates of $PM_{2.5}$ dimensions that may be inhaled by humans; and/ or
- contribute to compounds that may adhere to particulates inhaled by humans.

As noted above, the Department is satisfied that the proposed development will not significantly increase particulate concentrations at surrounding land uses, particularly those residential areas some five kilometres from the development site. It is noted that modelling presented in the EIS indicates a TSP concentration at the nearest MGIDS area boundary of 0.05 to 0.1 $\mu gm^{-3}$. As $PM_{2.5}$ represents a fraction of total particulates, the potential for sodium chlorate dust to increase synergistic effects is considered negligible.

In considering the potential for emissions from the sodium chlorate plant to adhere to existing particulate pollution, the Department notes that adsorption is generally charge-enhanced and stearic-inhibited. In relation to the compounds likely to be emitted from the sodium chlorate plant, the Department notes the following:

- **Chlorine ($Cl_2$)** - chlorine is a non-polar, linear molecule and is therefore unlikely to interact electronically (without electron transfer, reaction);
- **Sodium Chlorate ($NaClO_3$)** - as an ionic molecule there may be some potential for charge interaction. However, the likelihood of sodium disassociation is considered minimal in the absence of moisture. Further, there is likely to be some stearic interference given the bulk of the chlorate ion;
- **Hydrogen Chloride (HCl)** - as with sodium chlorate, it is unlikely that hydrogen and chlorine would ionically disassociate in the absence of moisture. It is more likely that the compound would react with particulates, thereby minimising the de-adsorption post-inhalation;
- **Hydrogen ($H_2$)** - as with chlorine, hydrogen is a non-polar, linear molecule and is therefore unlikely to interact electronically (without electron transfer, reaction); and
- **Oxygen ($O_2$)** - as with chlorine, oxygen is a non-polar, linear molecule and is therefore unlikely to interact electronically (without electron transfer, reaction).

Given the above observations, the Department considers it unlikely that emissions from the sodium chlorate plant will contribute to molecule-particulate synergistic effects (human inhalation health impacts).

Private submissions also raised the issue of possible atmospheric reaction of compounds emitted from the proposed development with existing atmospheric species to form a product with more significant environmental impacts that the initial reagents. The Department notes that for an atmospheric reaction to occur the following conditions must be met:

- the reagents must meet. The less concentrated the particular compounds in the atmosphere, the less likely that those compounds will actually come into contact with each other. It is noted that the most abundant compound in the atmosphere, $N_2$ is generally inert under most conditions;
- the reagents must meet in an appropriate orientation. Two reactive compounds may contact but not react because active reaction sites are not oriented in a manner that permits reaction. This is even more so for bulky compounds that may be subject to stearic interference. Dissolution in atmospheric moisture may reduce this as a restricting factor, but it is noted that dissolution in itself is subject to similar enhancing and restricting factors; and
- thermodynamics must be conducive to reaction. Compounds will not react if activation energies are not met, enthalpic and entropic energy "redistribution" is not thermodynamically desirable etc.

Considering the above factors, particularly the concentrations of pollutants likely to be emitted from the proposed development, the Department considers that the potential for atmospheric reaction would be minimal. In any case, the compounds emitted by the sodium chlorate plant ($NaClO_3$, $Cl_2$, HCl, $H_2$) would be in reaction-limiting concentrations, compared with atmospheric species such as $SO_2$, $O_2$, CO etc. The element of any concern would be

chlorine, as oxygen and hydrogen are already present in the atmosphere in reactive forms (therefore it is unlikely that any "new" compounds would result). It is noted from stoichiometry that any reaction with $NaClO_3$ would not increase the number of moles of the chlorine-containing compound (and may actually reduce the number of moles). A similar situation would result from any reaction with HCl. This concept is illustrated below:

$$Y - Cl + X \Rightarrow Y + X - Cl$$

In the case of $Cl_2$, the worst case would be a doubling of moles of the compound containing chlorine, as illustrated:

$$Cl_2 + 2X \Rightarrow X - Cl + X - Cl$$

This consideration highlights that at worst (assuming full $Cl_2$ reaction) there would be a doubling of chlorine compounds above the concentrations predicted in the EIS (0.06 $mgm^{-3}$ $Cl_2$ at the MGIDS area boundary). The Department does not consider that this would represent a significant environmental or human health issue.

Given the above, the Department considers the potential for reactive synergistic effects is minimal.

***Greenhouse Gases and Electricity Consumption***

The Department recognises that the proposed development is energy-intensive. As a consequence of its requirement for some 350.4 GWh/ year of power, the sodium chlorate plant will indirectly emit (through the Bayswater Power Station) significant quantities of carbon dioxide, sulfur dioxide and $NO_x$. It is noted from Macquarie Generation's annual report (2000) that during the power output from the Bayswater Power Station in 2000 was 16,156.8 GWh and from the Liddell Power Station, 7,451.44 GWh. Therefore, the proposed sodium chlorate plant can be expected to increase gaseous emissions from the Bayswater Power Station by some 2.17%. If emissions attributable to the sodium chlorate plant are compared with total current emissions from both power stations, the total increase in gases such as $SO_2$ and $NO_x$ from electricity generation in the Upper Hunter would be approximately 1.48%.

It is in the commercial best interests of the Applicant to minimise energy consumption at the development as far as possible. As such, the Department considers that reasonable mechanisms are in place to minimise energy consumption. Despite this, it is considered important that energy be effectively managed to ensure continued optimal use of power and to minimise consumption further, should appropriate avenues be established during the operation of the development. To this end the recommended instrument of consent includes a requirement to prepare and implement an Energy Management Plan to ensure that energy consumption, and associated indirect emissions of greenhouse gases, are managed and minimised over time (condition 6.5b)).

The Environmental Impact Statement makes reference to the production of hydrogen gas as a by-product of the sodium chlorate production process. The Applicant has stated that it aims to eventually sell the hydrogen to the Bayswater Power Station for use as a fuel. The Department supports this initiative as it represents substitution of a clean energy source (hydrogen combusts to form water) for current coal-burning practices. It is noted from the PHA for the proposal that hydrogen will be generated at a rate of 430 $kgh^{-1}$ (215,000 $molh^{-1}$). Noting a standard heat of formation for water (gaseous phase) of -241.8 $kJmol^{-1}$, it may be estimated that the theoretical ideal energy production from combustion of that hydrogen stream would be 51,992 $kJh^{-1}$ (455,455 $GJy^{-1}$). This is equivalent to 126.5 GWh per year. Although this is a theoretical calculation that does not take into account system inefficiencies (heat transfer, energy losses through compression, etc), it does illustrate that the use of hydrogen would have a significant off-set effect in relation to the power consumption by the sodium chlorate plant (350.4 GWh per year) and the associated emissions of $SO_2$, $NO_x$ and greenhouse gases.

However, the EIS does not provide sufficient information in relation to hydrogen collection, compression and piping infrastructure for the Department to support approval or implementation of such a measure at this time. It is noted that both the Applicant and Macquarie Generation have stated in-principle support of using hydrogen as a substitute energy source but have recognised that there are issues, including the quality of the hydrogen gas, infrastructure and power station alterations, that would require resolution before the concept could be implemented. To ensure that this idea is developed further, the recommended instrument of consent requires the Applicant to develop and implement a Hydrogen Substitution Strategy (condition 6.5c)). The Strategy is required to detail how hydrogen substitution will continue to be investigated and developed. The instrument does note, however, that implementation of hydrogen substitution may require a separate approval under the *Environmental Planning and Assessment Act 1979*.

***On-Going Air Quality Management***

The Department recognises the importance of an on-going air quality management system for the proposed development and integration of that management with the air quality management for other developments in the MGIDS area. As such, the recommended instrument of consent requires the Applicant to prepare and implement an Air Quality Management Plan (condition 6.5a)). The Plan must include mechanisms for the consideration of cumulative air impacts from the MGIDS area.

## 4.2 Hazards and Risk Impacts

**Applicant's Position**

***Operational Hazards***

In accordance with the provisions of *State Environmental Planning Policy No. 33 - Hazardous and Offensive Development*, the Applicant prepared a Preliminary Hazard Analysis (PHA) as part of the Environmental Impact Statement for the proposed development.

The Applicant highlights that it operates a number of plants overseas similar to the proposed development. As such, it considers that it has substantial knowledge of the technology to be employed and recognises its limits, restrictions and potentially hazardous nature. Based on this operating knowledge, a hazard identification process was undertaken to identify all potential incidents that may occur on the site. The PHA indicates that of the hazardous incidents considered, only three have the potential to affect land outside the site boundary:

- release of cell gas (containing chlorine) from the tail gas scrubber;
- release of chlorate dust from the dryer scrubber; and
- release of chlorate dust from the baghouse.

Dispersion modelling was performed by the Applicant to assess the risk impacts of the release of chlorine in the event of a coincident failure of the brine scrubber and the tail gas scrubber. Modelling was performed assuming a series of different meteorological conditions. Results of this modelling are presented in the PHA and summarised below.

**Table 2 - Chlorine Dispersion Results**

| Stability Class | Wind Speed ($ms^{-1}$) | 10-Minute Average $Cl_2$ Concentration (ppm) | 30-Minute Average $Cl_2$ Concentration (ppm) |
|---|---|---|---|
| B | 3 | 1.9 | 1.5 |
| D | 1.5 | 0.6 | 0.8 |
| D | 5 | 0.5 | 0.6 |
| D | 9 | 0.2 | 0.4 |
| E | 4 | 0.5 | 0.6 |
| F | 1.5 | 2.4 | 2.1 |

The Applicant highlights that the predicted concentrations (as summarised above) represent the maximum concentrations of chlorine under different release scenarios. In all cases, the maxima were predicted within the boundary of the proposed development site. The worst-case scenario (F class, 1.5 $ms^{-1}$ wind) resulted in maximum 10-minute average concentration of 2.4 ppm. The Applicant suggests that 5 ppm of chlorine is required to cause nuisance or irritation. Consequently, the PHA concludes that under a worst-case scenario, the likely maximum chlorine concentration would, at its most extreme, cause mild irritation to humans on the development site. Qualitative extrapolation of the dispersion modelling results, noting the distance of the site from the MGIDS boundary and off-site residential receptors indicates that a worst-case chlorine release would not have an impact on any external receptor.

In considering a release of sodium chlorate dust from the dryer scrubber, the Applicant notes that the likely concentration of dust released would be 113 $gm^{-3}$. The maximum release duration is estimated at 10 minutes. The Applicant notes that the average adult human breathing rate is 0.015 $m^3$ per minute. Therefore, the greatest dose of sodium chlorate that could be inhaled by a human as a result of a dryer scrubber failure would be 17g. The PHA quotes literature sources that suggest, in one case, that 5-10 g of sodium chlorate may be fatal to humans, and in a separate reference, that 15-30 g may be fatal. It is acknowledge in the PHA that the maximum predicted dose of sodium chlorate (17 g) may be sufficient to cause fatality, or at least injury, based on quoted lethal doses from literature. However, the Applicant highlights that the predicted maximum dose is based on a human being at the point of discharge and inhaling the released dust for a full ten minutes. In reality any release of sodium chlorate would be subject to atmospheric dispersion and the actual does experience by an off-site receptor would be significantly reduced. The Applicant concludes therefore that there would be no significant risk impact associated with such a dust release.

The PHA also indicates that a release of sodium chlorate from the development's baghouse may be possible as a result of a serious hazardous incident. However, it is noted that the flowrate through the baghouse is less than that through the dryer scrubber. Consequently, the Applicant concludes that the maximum release of dust would be less than the dryer scrubber, for which fatality risk impacts were shown to be negligible (implying fatality risk from a baghouse release would also be negligible).

To address general hazards and risk issues associated with the proposed development, the Applicant intends to implement the following:

- good engineering design, including appropriate materials selection and equipment specification;
- review of incidents from other plants in the past three years to identify and rectify any potential design issues; and
- a safety management system based on the Applicant's established safety management systems for other plants.

***Transport Hazards***

The Applicant indicates that there have only be 18 road accidents on the New England Highway in the vicinity of the MGIDS area in the past five years. Of these, only one accident was associated with the clover-leaf intersection providing access to the MGIDS area. The Applicant suggests that because predicted traffic impacts associated with the proposed development are minor, and that only 15% of vehicle movements will involve heavy vehicles, the proposal will have a negligible effect on accident rates on the New England Highway.

The Environmental Impact Statement for the proposed development does not present any assessment of the potential risk impacts associated with the haulage of dangerous goods. The table below summarises information presented through the EIS in relation to the expected frequency of dangerous goods movements to and from the development site.

**Table 3 - Dangerous Goods Movements**

| Material | Dangerous Goods Class | Daily Delivery/ Supply Frequency (vehicles per day) | Weekly Delivery/ Supply Frequency (vehicles per week) |
|---|---|---|---|
| Salt (NaCl) | - | 4.73 | 33.1 |
| Hydrochloric Acid (HCl) | 8 PGII | 0.32 | 2.2 |
| Caustic (NaOH) | 8 PGIII | 0.24 | 1.7 |
| Other Chemical Deliveries | 2.2, 5.1 PGII | 0.11 | 0.8 |
| Sodium Chlorate ($NaClO_3$) | 5.1 PGII | 8.62 | 60.3 |
| Mud Wastes | 5.1, 6 | 0.04 | 0.25 |

**Issues Raised in Submissions**

In its submission to the Department, Newcastle Port Corporation noted that sodium chlorate is a class 5.1 dangerous good and must comply with relevant codes if handled at the Port. Further, the Corporation indicated that the Port currently handles class 5.1 materials and would be capable of exporting sodium chlorate from the proposed development.

NSW Fire Brigades indicated that a Fire Safety Study for the development would need to include details of site access arrangements in the event of a fire or other emergency situation. The Brigades' submission also highlighted the need for a strict maintenance schedule for essential services and other safety measures on the site. A note was made in the submission that the EIS for the proposal indicated that the Brigades would be briefed and made familiar with the development prior to its construction. The Brigades support this measure.

Council requested that the Applicant be required to prepare and implement an Emergency Management Plan prior to the commencement of construction of the proposed development.

A number of private submissions from individuals and groups were received that raised hazards and risk impacts as being of concern. Issues raised in these submissions are:

- risk of explosion or fire associated with hydrogen leaks;
- lack of consideration of fires, fire safety measures, containment measures for contaminated firefighting water and the absence of a full Fire Safety Study as part of the EIS;
- knock-on effects from the proposed sodium chlorate plant impacting on the operation of the Bayswater Power Station;
- inadequacy of the PHA as it was based on information from other similar plants at other locations in the world (not Australia);
- inadequacy of the screening and assessment process under SEPP 33 and compliance with the guideline *Applying SEPP 33*;
- there was no consideration of sodium chlorate dust explosions in the PHA;
- concerned about transport hazards;
- notes that Material Safety Data Sheets (MSDS) are not Australian; and
- concerned about procedures to be followed in the event of an emergency.

**Department's Position**

***Operational Hazards***

The Department generally concurs with the conclusions of the Preliminary Hazard Analysis prepared for the proposed development. Generally the Department considers that the process and level of detail provided in the PHA accords with relevant guidelines (including those presented in *Applying SEPP 33*).

The foreign nature of Material Safety Data Sheets (MSDS) and process information was highlighted in a submission from the public as being a source of concern and inaccuracy in the data presented in the EIS. The Department notes that the process information provided in the EIS relates to the technology and materials to be employed at the proposed development.

This information is independent of location and would not change with geographic location. Similarly, MSDS provide information on the chemical properties of a particular material, include reactivities, flammabilities, toxicities etc. These properties are a function of the chemical composition of the material and are geographically invariant. The Department does not consider that the country in which this information was generated is an issue for serious consideration.

From the results of the PHA it is noted that the toxic effects of a release of chlorine or sodium chlorate are the only events that may potentially affect off-site receptors. The Applicant has demonstrated that the off-site human fatality, injury and irritation risks associated with these events are minimal and below the land use safety planning criteria advocated by the Department. In the case of a sodium chlorate dust release, it is noted from the PHA that the concentration of dust quoted is sufficient to cause fatality or at least injury. The Department recognises however that the Applicant has assumed an over-conservative case in this instance. That is, that human is located at the point of discharge (at the stack discharge) and continues to inhale the discharged particulates for a duration of 10 minutes. This is highly unlikely in reality, firstly because a human is unlikely to be that close to the point of discharge, and secondly because having inhaled sodium chlorate dust and felt its irritating effects, a human is unlikely to remain stationary at that point for 10 minutes. A similar consideration suggests that the assessment of chlorine leak impacts presented in the PHA is also highly conservative. In both cases (releases of sodium chlorate and chlorine), the release is initiated by a failure of the process. To ensure that all process design measures are identified and addressed, the recommended instrument of consent requires the Applicant to commission an independent qualified person or team to conduct a Hazard and Operability Study (HAZOP) of the proposed development prior to construction (condition 6.3b)).

Members of the public are concerned about the potential for fires and explosions associated with the proposed development, and believe that the PHA did not adequately address these issues. In relation to sodium chlorate, the Department notes that this compound is an oxidising agent that may cause fires and/ or explosions when in contact with another material than may be easily oxidised. When associated with fires, the sodium chlorate can fuel the fire with oxygen, causing the fire to burn more intensely that it otherwise may. The important issue to bear in mind is that although sodium chlorate is an oxidising agent, it is not a serious hazard unless brought into contact with a material that may be oxidised. Examples of such materials include fuels, organic matter, finely powered metals, sulfur, phosphorous etc. These materials will either not be located on, or in the vicinity of, the development or be located in such a manner (diesel fuel) so as to represent a minimal risk of contact with sodium chlorate. Hypothetically, should an organic contaminant be brought to the site and contacted with sodium chlorate, any reaction would be limited by the quantity of the contaminant (minimal). It is in the best interests of the Applicant to ensure that sodium chlorate is not contaminated, not only for risk reduction reasons, but also for commercial reasons (product quality). As such, the Department considers that the frequency of such an incident would be minimal, thereby reducing the resultant risk.

Another area of concern raised in the submission received by the Department was the potential for hydrogen gas to be involved in fires and explosions at the development, and for those incidents to potentially impact on the Bayswater Power Station. It is noted from information provided in the PHA that the gas collected from the electrolytic cells of the development is predominantly hydrogen (54.5 vol%), with little other reactive compounds (1.4 vol% oxygen and 0.8 vol% chlorine) in an otherwise inert environment (43.2 vol% water and 0.1 vol% carbon dioxide). Under these conditions, the hydrogen would be generally unreactive. In order for a fire or explosion to be possible, the cell gas would have to first mix with an appropriate oxidant (most likely oxygen, but possibly chlorine). The Department notes that because no significant inventory of either oxygen or chlorine would be located on the development site, the only mechanisms for the generation of an explosive environment would be ingress of air into the process, or a leak of hydrogen from the process. In relation to the former, the Applicant has indicated that the electrolytic cells operate under positive pressure (relative to atmospheric pressure) through an exhaust seal tank arrangement to prevent ingress of air. Should the seal tank fail and air leak into the cells and associated pipework, the Applicant has indicated that these parts of the process are fitted with oxygen sensors. In the event that the hydrogen-oxygen ration of the cell gas reaches a point at which the gas is flammable, the cells will be shut down and the system purged with nitrogen. In relation to a

leak of hydrogen gas, it is noted that hydrogen is a light gas that disperses very rapidly (it has a specific gravity relative to air of approximately 0.06). Any minor leak of cell gas would disperse rapidly and is unlikely to cause a major incident. Larger leaks would lead to a pressure drop within the system, either indicating a failure through readings from pressure sensors or a failure of the seal tank arrangement. Consequently the process would either be automatically or manually shut-down and purged with nitrogen to alleviate the potentially hazardous incident. The Department therefore considers the potential for a hydrogen fire or explosion (given the safe guards in place) to be minimal. As no hydrogen is to be stored on the site, other than process inventories, the Department does not consider there to be sufficient fuel available to generate a radiation or explosion overpressure impact on the Bayswater Power Station, which lies approximately one kilometre from the proposed development site.

The Department notes that a submission received from the public raised the issue of chlorate dust explosion as being of concern. It is highlighted that deflagration (dust explosions) are associate with fine organic particulates suspended in an atmosphere conducive to explosion. Sodium chlorate is not an organic compound. It may, however, contribute to an explosion if combined with fine particles of metals or other oxidisable materials. Such materials are not present in the storage areas of the site in which suspensions of sodium chlorate dust may occur.

Despite the fact that the Applicant has demonstrated that the proposed development can be operated without generating a significant off-site impact, it is recognised that there still exists potential for incidents to occur on the site. In this regard, the Department supports the statement made in a submission from a member of the public that a full Fire Safety Study should be prepared for the proposed development. This requirement has been incorporated into the recommended instrument of consent (condition 6.3a)). It is noted that the requirement for a Fire Safety Study was also stated in the submission received from the NSW Fire Brigades.

Concern was also raised in a number of submissions regarding emergency planning for the proposed development. The Department has drafted the recommended instrument of consent to require the Applicant to prepare and implement a Safety Management System (condition 6.5g)) and an Emergency Plan (condition 6.5f)). As recognised by the Applicant in the Environmental Impact Statement, the proposed development represents a number of risks and hazardous incidents that are otherwise unique in the Upper Hunter. The Applicant proposes to address this issue by inviting the NSW Fire Brigades to the development site to be briefed on the sodium chlorate plant, its layout and hazards. The Brigades have supported this move, as indicated in the submissions received by the Department. The recommended instrument formalises this arrangement through an Emergency Services Cooperation Agreement (condition 3.19). The Agreement must be established between the Applicant and relevant emergency services and detail measures to ensure effective communication and cooperation both during an emergency and through on-going operations. The Department considers that this measure is an appropriate means to address the "unique" hazards associated with the proposed development.

***Transport Hazards***

The consideration of transport hazards presented in the EIS was not particularly well detailed. Despite this, the Department notes that the only material, transported to or from the proposed development, that is considered "potentially hazardous" is sodium chlorate. The predicted peak weekly vehicle movements associated with the transport of sodium chlorate (60.3) exceeds the Department's recommended screening threshold of 3- movements per week of class 5 materials. It is noted, however, that the Applicant intends to transport a large proportion of sodium chlorate product in Flexible Intermediate Bulk Containers (FIBC). Each FIBC has a capacity of one tonne. In the event of an accident involving a truck carrying FIBCs of sodium chlorate, the Department recognises that the potential magnitude of crystal release from FIBC transport is significantly less than for bulk transport (20 tonne capacity). In such an event one, or possibly two, FIBCs may lose integrity and spill product, which represents a lower potential risk than release of up to 20 tonnes in a single accident. While the potential risk of an incident during transport of sodium chlorate is not considered signficant, the Department considers it prudent to require the preparation of a Transport of

Hazardous Materials Study prior to the commencement of operation of the proposed development (condition 6.5h)). The Study is required to examine transport routes, safety measures and emergency planning.

Although a number of feed materials for the production of sodium chlorate are classified as dangerous goods, the Department considers that these materials pose a minimal risk to humans. Of note in this regard are hydrochloric acid (32% solution, class 8 PGII) and sodium hydroxide (50% solution, class 8 PGIII). A vehicle collision resulting in a release of these materials would be less likely to have a significant human fatality risk than a material generating a fire or explosion (greater affectation area attributed to heat radiation or explosion overpressure). The issue associated with these materials is the potential impacts on the biophysical environment should a spill occur. Similarly, although salt is not classified as a dangerous good and does not pose a human fatality risk, it does represent a potential negative impact on the biophysical environment should it be accidentally be released. To ensure that the potential for accidents to occur, and for these materials to be released, the recommended instrument of consent requires a Transport Code of Conduct (condition 6.5i)). The Code must set out transport requirements to ensure that all heavy vehicle movements are undertaken in a manner that minimises the potential for accidents.

## 4.3 Water Quality Impacts

**Applicant's Position**

***Water Supply***

The Applicant intends to source water for the proposed sodium chlorate from Macquarie Generation at a rate of 2 megalitres per day of operation. The EIS notes that Macquarie Generation is authorised to take water from the Hunter and Barnard Rivers in accordance with a licence issued under Part 9 of the *Water Management Act 2000*. It is highlighted in the EIS that the aforementioned licence permits Macquarie Generation to sell or supply water users to other parties.

***Surface Water Impacts***

The Applicant notes that the proposed development site is an existing hardstand area characterised silty sandstone and clay materials. Due to the flat compacted nature of the site, the Applicant does not propose to alter the existing topography during construction. It is highlighted in the EIS that due to the site being level, significant run-off and associated erosion is unlikely. Run-off from the site will drain to the northern end of the site where an existing retention pond would act as a sediment trap. While the site itself will not undergo major earthworks, the Applicant suggests that an areas of approximately 40 metres by 60 metres adjacent to the site will need to be filled to a depth of approximately 10 metres to provide a stable basis for an upgraded site access point. The Environmental Impact Statement provides a draft Erosion and Sediment Management Plan which the Applicant intends to implement during construction works.

The Environmental Impact Statement indicates that surface water run-off from the proposed development site currently drains to a depression (retention pond) at the northern end of the site. Water overflowing from the retention pond enters Tinkers Creek which runs parallel to the development site and eventually flows into Lake Liddell. Tinkers Creek currently receives run-off from the Bayswater Power Station and associated coal preparation area, as well as licensed discharges from the Power Station's water management systems.

The Applicant states in the EIS that the proposed development will be fully paved and bunded. As such there will be little likelihood of contaminated water draining from the site. However, the Applicant intends to install a high-density polyethylene liner under the site to minimise the potential for the development to impact on groundwater (refer to the following section of this report for further details of groundwater management). A liner is also proposed to be installed in the existing retention pond in the event that contaminated water drains from the site. The Applicant also proposes to expand the retention pond to a volume adequate to handle a 20-year recurrent, 24-hour storm event.

Under normal circumstances, the Applicant indicates that water streams will be recycled within the proposed development, thereby negating any need to discharge water from the site. However, there may be need for occasional discharge of cooling water blowdown to Tinkers Creek when the blowdown cannot be recycled for quality or quantity reasons. To assess the potential impacts of cooling water blowdown on water quality, the EIS presents monitoring data from Freshwater Dam (discharges to Tinkers Creek) and Lake Liddell (receives water from Tinkers Creek). This data is summarised below.

**Table 4 - Freshwater Dam and Lake Liddell Existing Water Quality**

| | Freshwater Dam | Lake Liddell |
|---|---|---|
| **Parameter** | **Median Monthly Value** | **Median Monthly Value** |
| pH | 9.0 | 8.4 |
| Conductivity ($\mu Sm^{-1}$) | 63,834 | 185,000 |
| Hardness - calcium ($mgL^{-1}$) | 48.3 | 194 |
| Hardness - total ($mgL^{-1}$) | 162 | 453 |
| Chloride ($mgL^{-1}$) | 97.9 | 295 |
| Sulfate ($mgL^{-}$) | 43 | 398 |
| Alkalinity - methyl orange ($mgL^{-1}$ as $CaCO_3$) | 132.2 | 136 |
| Alkalinity - phenolphthalein ($mgL^{-1}$ as $CaCO_3$) | 19.2 | 5 |
| Silica ($mgL^{-1}$ as $SiO_2$) | 3 | - |
| Total dissolved solids ($mgL^{-1}$) | 366.2 | 1,188 |
| Sodium ($mgL^{-1}$) | 69.3 | 228 |
| Iron ($mgL^{-1}$) | 0.3 | - |
| Copper ($mgL^{-1}$) | 0.04 | - |
| Aluminium ($mgL^{-1}$) | 0.06 | - |

The Applicant highlights that the highest rate of blowdown discharge from the proposed development would be 120 $m^3$ per day. Depending on which treatment process is employed to treat cooling water at the sodium chlorate plant, the blowdown may be responsible for 112kg per day of sulfate (if sulfuric acid is employed) or 83 kg per day of chloride per day (if hydrochloric acid is employed). The Applicant notes that other ions will also be discharged in the blowdown as a result of the use of water treatment chemicals and biocides. A summary of the quantity of blowdown chemicals discharged is provided below.

**Table 5 - Blowdown Chemical Discharge Rates**

| Compound/ Ion | Discharge Rate (kg per day) |
|---|---|
| pH control - sulfate or chloride | 112 or 83 |
| Biocide - sodium | 1.5 |
| Biocide - chloride | 2.4 |
| Proprietary chemical - phosphate | 2.0 |
| Proprietary chemical - zinc | 0.1 |
| Proprietary chemical - organic dispersant | 2 |

The Environmental Impact Statement indicates that Macquarie Generation is required to remove and dispose of salt accumulated in the water of Lake Liddell in accordance with the framework established under the Hunter River Salinity Trading Scheme. The Scheme limits the discharge of saline water from Lake Liddell into the Hunter River.

### *Groundwater Impacts*

The Environmental Impact Statement suggests the hydrogeological conditions in the vicinity of the proposed development site are complex due to significant faulting and folding. Regional groundwater quality is degraded due to coal mining in the area with water samples taken from various mines in the area exhibited high levels of dissolved solids and often being highly acidic.

The development site itself is characterised by a cut-and-fill configuration, having being a hardstand area employed during the construction of the Bayswater Power Station. Soils on the site are predominantly sandstone and conglomerate on the north side of the site, and fill on the south side. Permeability testing undertaken by the Applicant suggests that the permeability of the bedrock strata is very low. The Applicant estimates that the groundwater under the site moves in an easterly direction at a very slow rate (approximately 1.3 metres per year). Testing of groundwater quality beneath the site suggests that it is highly degraded, probably due to past disturbance and local coal mining.

The Applicant recognises the poor quality of local groundwater and suggests that the proposed development would not significantly impact on groundwater quality. This position is based on the fact that the proposed development is to be fully paved and bunded, and the soil underlying the development site is relatively impermeable. However, the Applicant intends to install a high-density polyethylene liner under the development as an extra precautionary measure.

**Issues Raised in Submissions**

The EPA included provisions in its General Terms of Approval related to monitoring of surface water and groundwater quality. In addition, the General Terms require the preparation of plans to manage stormwater during construction and operation.

The Department of Land and Water Conservation (DLWC) provided an number of General Terms of Approval related to water supply, surface water management (including stormwater) and the management of groundwater beneath the proposed development site. In relation to water supply, DLWC requires that an agreement be established between the Applicant and Macquarie Generation for the supply of water under the provisions of Macquarie Generation's Part 9 licence. DLWC's General Terms also provide a series of conditions related to the management and location of groundwater monitoring bores, and requirements for the scope of a groundwater monitoring program. In relation to surface water, the General Terms require measures to stabilise watercourse banks, minimise erosion and vegetation removal, and appropriate design of stormwater control infrastructure.

In its submission, Council requested that any instrument of consent include requirements for the preparation and implementation of an Erosion and Sediment Control Plan and monitoring programs for surface and groundwater.

The Hunter Valley Water Users Association recommended that the Department consider the rate of water usage by the proposed development and its sustainability over the life of the development. Further, the Association raised concerns in its submission that the proposed sodium chlorate plant may lead to pollution of Lake Liddell and subsequently the Hunter River through contaminated water discharges and firefighting water.

Other submissions received from private individuals raise concern over the rate of consumption of water and the development and the ability of this demand to be met in the long term. Submissions also highlight run-off from the site and potential pollution of Lake Liddell and the Hunter River as being of concern. In relation to groundwater impacts, two submissions question the effectiveness of the proposed HDPE liner to underlie the proposed development.

**Department's Position**

***Water Supply***

The Department notes that the Applicant intends to source water of the proposed development from Macquarie Generation from its Part 9 licence. In relation to that licence, the Department notes the following:

- Macquarie Generation is allocated up to 72,000 megalitres of water per year. The Bayswater and Liddell Power Stations currently use approximately 55,000 megalitres, leaving 17,000 megalitres per year that the licence permits Macquarie Generation to sell to other users; and

- Macquarie Generation may also "trade" water from other sources. This involves the purchase of all or part of a water allocation issued to another user, for sale to a third party.

All use or trade of allocated water must be undertaken in accordance with a Site Management Plan which generally details how water will be managed/ allocated.

It is noted that the Department of Land and Water Conservation (DLWC), who administers Macquarie Generation's licence has not raised any concern in relation to the quantity of water required by the proposed development or the ability of Macquarie Generation to supply that water. DLWC did, however, request that the Applicant be required to supply details of an agreement between the Applicant and Macquarie Generation for the supply of water, consistent with the Site Management Plan. This requirement has been incorporated into the recommended instrument of consent (condition 3.16).

The Department is satisfied that the water supply for the proposed development has been addressed through the assessment and licensing process administered by DLWC. On-going management of the water supply will be covered by the Site Management Plan established by Macquarie Generation for its Part 9 licence.

***Surface Water Impacts***

The Department notes that the proposed development site is a flat hardstand area. Consequently there is unlikely to be significant site preparation works required prior to construction of the sodium chlorate plant and therefore a low likelihood of major erosion issues. It is noted however that site access works will require the movement and compaction of soil that may initiate erosion and sedimentation problems if not appropriately managed. As such the Department supports the Applicant's proposal to implement an Erosion and Sedimentation Management Plan. This position is further supported in the submissions made by Council and DLWC. The recommended instrument of consent requires preparation and implementation of such a Plan as part of the Construction Environmental Management Plan for the proposed development (conditions 6.2 and 6.3).

In relation to the impact of cooling water blowdown discharges to Tinkers Creek, the Department considers that the information presented in the EIS may be misleading. The Applicant has quoted maximum blowdown and ion/ compound discharge rates, rather than presenting the discharge concentration of each of the pollutants. Concentrations calculated by the Department (from data presented in the EIS) are provided in the table below, with concentrations of relevant pollutants in Lake Liddell also provided.

**Table 6 - Calculated Blowdown Chemical Discharge Concentrations**

| Compound/ Ion | Discharge Rate (kg per day) | Discharge Concentration ($mgL^{-1}$) | Lake Liddell Concentration |
|---|---|---|---|
| pH control - sulfate or chloride | 112 or 83 | 933 or 692 | 398 or 295 |
| Biocide - sodium | 1.5 | 12.5 | 228 |
| Biocide - chloride | 2.4 | 20 | 295 |
| Proprietary chemical - phosphate | 2.0 | 16.7 | - |
| Proprietary chemical - zinc | 0.1 | 0.8 | - |
| Proprietary chemical - organic dispersant | 2 | 16.7 | - |

It can be seen from the table above that the concentration of sodium in the cooling water blowdown from the proposed development is much lower than that currently characterising Lake Liddell. Therefore it is logical to deduce that blowdown will not have an impact on sodium levels in the Lake. In relation to sulfate and chloride, it is noted that blowdown concentrations are approximately two and a half times that present in Lake Liddell. In order for the blowdown to have minimal impact on water quality in Lake Liddell, the blowdown would need to be diluted by at least two and a half times. In this regard, the Department notes that the maximum rate of blowdown predicted by Applicant is approximately 120,000

litres per day. This volume is negligible in comparison with Lake Liddell, which has a storage capacity of 152,000 megalitres (ie more than 1,200 times the volume).

If mitigating factors are ignored (ie rain, Macquarie Generation's desalting operations etc) the Department estimates that it would take 100 days of blowdown adding to current concentrations of sulfur or chloride in Lake Liddell to see a 1% change in the concentration of either ion. In reality is unlikely that such a conservative situation would exist. The Department therefore considers that the actual impact of blowdown water on the water quality in Lake Liddell (and the Hunter River) would be minimal.

***Groundwater Impacts***

The Department recognises that full paving and bunding of the proposed sodium chlorate plant will significantly reduce the potential for groundwater impacts. It is further recognised that the inherent nature of the soils characterising the site and the compaction of the soils has lead to low permeability. Despite these mitigating measures, the Applicant intends to install a high-density polyethylene (HDPE) liner as a further line of defence against groundwater contamination. The Department supports this measure and has reinforced the Applicant's commitment through the recommended instrument of consent. Conditions include the restriction of storage of chemicals, including salt and sodium chlorate, to areas under which the liner is installed (condition 3.18). The instrument also requires dangerous goods to be bunded (condition 3.17). The Department is satisfied that these measures are adequate to minimise impacts on groundwater quality.

To ensure that the mitigating measures continue to be effective over time, the instrument also requires the quality of groundwater to be monitored (condition 4.8). This is consistent with the General Terms and recommended conditions provided in submissions from the EPA, DLWC and Council. In accordance with the General Terms supplied by DLWC, groundwater will be monitored through bores installed, operated and maintained to meet the requirements of DLWC (conditions 3.8 to 3.11).

***On-Going Water Management***

The Department recognises the importance of on-going surface water and groundwater management systems for the proposed development and integration of those systems with water management for other developments in the MGIDS area. As such, the Applicant must prepare and implement Surface Water and Groundwater Management Plans (condition 6.5d) and 6.5e)). The Plans must include mechanisms for consideration of cumulative water impacts (surface and groundwater) from the MGIDS area.

## 4.4 Transport Impacts

**Applicant's Position**

The Environmental Impact Statement indicates that the proposed development site is currently serviced by a private road owned and maintained by Macquarie Generation. This road forms part of the private access road network supplying the Bayswater and Liddell Power Stations. Th private road network is connected to the New England Highway via a clover-leaf intersection. In the vicinity of the intersection, the New England Highway is dual carriageway. The Applicant highlights that no additional roads will need to be constructed to service the proposed development.

***Construction Traffic***

The Applicant has estimated that construction of the sodium chlorate plant will take 19 months. Most traffic generated during construction will be experienced during the first ten months, with an expected peak during the second month. Peak construction traffic is predicted to comprise 205 vehicle movements per day. Of this traffic volume, 68 movements will involve heavy vehicles and 137 movements will be due to light vehicles. To establish the impacts associated with construction traffic, the Applicant considered a worst-case scenario. That is, construction traffic generated during the peak of construction, impacting on roads experiencing existing peak traffic flows (ie morning and afternoon peak periods). Traffic contributions under this worst-case scenario are presented in the EIS and summarised below.

**Table 7 - Northbound Construction Traffic Assessment**

| Location | Peak Period | Existing Traffic Movements per Hour (%Capacity | Added Traffic Movements per Hour (%Capacity) |
|---|---|---|---|
| North of Clover-Leaf Intersection | Morning | 425 (42%) | 427 (43%) |
| | Afternoon | 310 (31%) | 356 (36%) |
| South of Clover-Leaf Intersection | Morning | 550 (55%) | 572 (58%) |
| | Afternoon | 310 (31%) | 310 (31%) |

**Table 8 - Southbound Construction Traffic Assessment**

| Location | Peak Period | Existing Traffic Movements per Hour (%Capacity | Added Traffic Movements per Hour (%Capacity) |
|---|---|---|---|
| North of Clover-Leaf Intersection | Morning | 270 (27%) | 283 (28%) |
| | Afternoon | 540 (54%) | 540 (54%) |
| South of Clover-Leaf Intersection | Morning | 270 (27%) | 276 (28%) |
| | Afternoon | 640 (64%) | 712 (71%) |

The Applicant highlights that the maximum predicted traffic impact associated with the construction of the sodium chlorate plant is a 7% increase in capacity utilisation of the New England Highway (southbound, south of the clover-leaf intersection). The maximum construction traffic impacts are expected for a single month during the construction period (month nine). Traffic impacts will be reduced slightly below this level for nine out of the first ten months of construction. The final nine months of the 19 month construction period will be subject to even lower traffic impacts. The Applicant considers that construction traffic will have minimal impact on road capacity.

The Environmental Impact Statement also presents a consideration of construction traffic generation on intersections (the clover-leaf intersection). Predicted capacity utilisation changes for the clover-leaf intersection are presented in the EIS and summarised below.

**Table 9 - Construction Traffic Impacts on the Clover-Leaf Intersection**

| Location | Peak Period | Existing Capacity Utilisation (%) | Predicted Capacity Utilisation (%) |
|---|---|---|---|
| Northern Southbound On-Ramp | Morning | 3.0 | 3.0 |
| | Afternoon | 0.3 | 0.3 |
| Southern Southbound On-Ramp | Morning | 6.4 | 8.2 |
| | Afternoon | 0.6 | 0.6 |
| Northbound On-Ramp | Morning | 7.4 | 8.6 |
| | Afternoon | 0.6 | 0.6 |
| Southbound Off-Ramp | Morning | 0.6 | 1.2 |
| | Afternoon | 11.3 | 18.5 |
| Northbound Off-Ramp | Morning | 1.0 | 1.3 |
| | Afternoon | 10.7 | 17.3 |

The Applicant highlights that existing traffic utilising the clover-leaf intersection does not constitute a significant utilisation of the intersection. Although the worst-case will see parts of the intersection increase capacity utilisation by approximately 7% (southbound and northbound off-ramps), the Applicant notes that capacity utilisation will not exceed 20% at any time during construction.

***Operation Traffic***

The Applicant summarises heavy vehicle movements associated with the proposed development as provided in the table below.

**Table 10 - Heavy Vehicle Movements (Operation)**

| Material | Heavy Vehicle Movements per Day | Heavy Vehicle Movements per Week |
|---|---|---|
| Sodium chlorate | 8.62 | 60 |
| Salt | 4.73 | 33.1 |
| Hydrochloric Acid | 0.32 | 2.2 |
| Caustic | 0.24 | 1.7 |
| Other Chemicals | 0.11 | 0.8 |

In addition to heavy vehicle movements, the Applicant indicates that the proposed development will operate on two shifts per day (6:00 am to 6:00 pm and 6:00 pm to 6:00 am), with four operators on each shift. There will be four maintenance staff and ten administrative staff working from 8:00am to 4:00 pm each weekday. During the week there will be 25 staff employed during normal working hours and on the weekend only four. The Applicant states that the maximum predicted trips per weekday would be 22, with 8 trips made on the weekend.

Based on these predicted vehicle movements, the Applicant modelled the change in road capacity utilisation during morning and afternoon peak periods. The results of this modelling are presented in the EIS and summarised in the tables below.

**Table 11 - Northbound Operation Traffic Assessment**

| Location | Peak Period | Existing Traffic Movements per Hour (%Capacity | Added Traffic Movements per Hour (%Capacity) |
|---|---|---|---|
| North of Clover-Leaf Intersection | Morning | 425 (42%) | 425 (42%) |
| | Afternoon | 310 (31%) | 314 (31%) |
| South of Clover-Leaf Intersection | Morning | 550 (55%) | 553 (55%) |
| | Afternoon | 310 (31%) | 311 (31%) |

**Table 12 - Southbound Operation Traffic Assessment**

| Location | Peak Period | Existing Traffic Movements per Hour (%Capacity | Added Traffic Movements per Hour (%Capacity) |
|---|---|---|---|
| North of Clover-Leaf Intersection | Morning | 270 (27%) | 272 (27%) |
| | Afternoon | 540 (54%) | 540 (54%) |
| South of Clover-Leaf Intersection | Morning | 270 (27%) | 271 (27%) |
| | Afternoon | 640 (64%) | 647 (65%) |

The Applicant highlights that in all cases the operation of the proposed sodium chlorate plant will produce a capacity utilisation increase of less than 1% (the 1% increase suggested for south of the clover-leaf intersection is a result of rounding and is actually 0.7%). The Applicant concludes that the New England Highway will be virtually unaffected by traffic movements generated by the operation of the sodium chlorate plant.

As with construction traffic, the Applicant has also undertaken an assessment of the capacity utilisation of the clover-leaf intersection when subjected to operational transport movements. This assessment is summarised in the table below.

**Table 13 - Operation Traffic Impacts on the Clover-Leaf Intersection**

| Location | Peak Period | Existing Capacity Utilisation (%) | Predicted Capacity Utilisation (%) |
|---|---|---|---|
| Northern Southbound On-Ramp | Morning | 3.0 | 3.0 |
| | Afternoon | 0.3 | 0.3 |
| Southern Southbound On-Ramp | Morning | 6.4 | 6.6 |
| | Afternoon | 0.6 | 0.7 |
| Northbound On-Ramp | Morning | 7.4 | 7.7 |
| | Afternoon | 0.6 | 0.7 |
| Southbound Off-Ramp | Morning | 0.6 | 0.6 |
| | Afternoon | 11.3 | 12.0 |
| Northbound Off-Ramp | Morning | 1.0 | 1.0 |
| | Afternoon | 10.7 | 11.2 |

The Applicant highlights that the operation of the proposed sodium chlorate plant will not consume more than 1% of the capacity of the clover-leaf intersection. The Applicant considers that this is not a significant impact. It further notes that capacity utilisation of the intersection will not exceed 12%.

**Issues Raised in Submissions**

The Roads and Traffic Authority recommended that the Department seek comment from Council in relation to the impacts of the proposed development on local roads. It is noted that the RTA did not raise traffic impacts on the New England Highway as being of concern.

The only comment made by Muswellbrook Shire Council in its submission related to traffic and transport impacts was related to site access and parking. Council requested inclusion of a condition in any recommended instrument of consent requiring design of access roads, loading and unloading areas and carparking facilities to comply with Council's Development Control Plan No.1 - Off-Street Parking Guidelines.

Submissions from members of the community raised a number of issues in relation to transport and traffic impacts, particularly:

- concern over the impacts of heavy vehicle movements on the New England Highway;
- concern that alternative transport options, including rail haulage have not been considered in the EIS;
- dissatisfaction that transport impacts further from the development, including on the townships of Branxton, Greta, Lochinvar and Maitland, were not considered in the EIS; and
- concern that cumulative traffic impacts were not considered.

**Department's Position**

***Construction Traffic***

From the information presented in the EIS, it is apparent that construction traffic associated with the sodium chlorate plant will not generate a significant traffic impact. At the peak of construction the greatest change in capacity utilisation of the New England Highway in the vicinity of the MGIDS area will be 7% (southbound, afternoon peak, south of clover-leaf intersection). The EIS also indicates that for 10 out of the 19 months of construction, traffic movements will be less than half that experienced at the construction peak. During another eight of the months, movements will be approximately 80% of peak flows. This highlights that the assessment of construction traffic impacts detailed in the EIS represents a worst-case scenario.

The maximum increase in capacity utilisation of the clover-leaf intersection will be similar to increase for the New England Highway (the EIS states that the capacity of each is 1,000

movements per hour). However, due to existing traffic movements, the capacity utilisation for the intersection is not expected to exceed 20% during the construction period.

Because the development site is a reasonable distance from major centres (Muswellbrook, Singleton, Maitland, Newcastle), it is recognised that construction traffic impacts may be experienced elsewhere along the New England Highway. Particularly, the Department considers that given travel time to the site, traffic impacts such as noise may be an environmental issue early in the morning or late at night when heavy vehicles may be travelling to or from the site. The General Terms of Approval provided by the EPA that limit construction hours are considered to be an effective means to minimise construction traffic impacts such as noise. By limiting the times at which construction may commence and conclude, a restriction is also placed on traffic movement hours. The Department considers that this is an effective means to minimise construction traffic impacts.

The Department is satisfied that the proposed development will not produce significant transport impacts during construction.

***Operation Traffic***

The Department is satisfied that the Applicant has adequately demonstrated that the proposed sodium chlorate plant will have a minimal traffic impact during operation. The EIS indicates that the most extreme impact will be a 0.7% increase in capacity utilisation of the New England Highway near the MGIDS area. A similar maximum impact is predicted for the clover-leaf intersection.

A number of submissions from the public suggested that the EIS was inadequate because it did not consider cumulative traffic impacts, and did not consider impacts further along the New England Highway (through towns such as Singleton and Maitland). The Department considers that cumulative traffic impacts were considered in the EIS, but may have not been clearly stated. Existing vehicle movements were presented in the EIS and compared with predicted total vehicle movements along the Highway during the operation of the proposed development. This represents consideration of cumulative impacts. Further, by presenting data in the form of capacity utilisation figures, the Applicant also implicitly demonstrated the Highway's capacity to accept additional traffic movements in future (up to 100% capacity utilisation). This represents a demonstration of the Highway's capacity to accept future cumulative traffic impacts. The Department is satisfied that cumulative traffic impacts during operation of the proposed development will be negligible.

The Department does agree, however, that the EIS did not specifically consider traffic impacts further along the New England Highway, particularly towards Newcastle. The EIS indicates that the capacity of the Highway in the vicinity of the MGIDS area is 1000 movements per hour and that the maximum expected increase in capacity utilisation is 0.7%. The Department assumes that heavy vehicles associated with the proposed development will only travel along designated heavy vehicle routes and will use main roads. The smallest road the Department considers would be utilised by these vehicles would be a connector (a road providing access between urban areas, for example). Connectors have a capacity in the order of 200 vehicles per hour. Based on this observation, the maximum increase in capacity utilisation that could be expected at any point along the assumed transport route would be 3.5%. This is considered to be minimal and does not represent a significant traffic impact.

In its submission, Council requested that the Applicant be made to comply with its Development Control Plan No. 1 - Off-Street Parking Guidelines. The Department considers that adequate provision has been made at the proposed development for parking. In addition to parking areas proposed for the development, the Bayswater Power Station has parking arrangements. The Department believes it is unlikely that the proposed development will cause vehicles to be parked off the site in a manner that would cause a nuisance or a hazard. In this regards, it is highlighted that the access road network leading to the development site is a private network with no public access or thoroughfare. In the vicinity of the MGIDS area, the only road is the New England Highway. The Department is satisfied that it would not be in the best interests of the Applicant (and would generally be impractical) for vehicles associated with the sodium chlorate plant to be parked along the New England Highway.

Although the Department is satisfied that traffic impacts on road capacities, the Department considers it important to ensure that safety and amenity issues associated with heavy vehicles are appropriately managed. To this end, the recommended instrument of consent includes a requirement for the Applicant to prepare and implement a Transport Code of Conduct (condition 6.5i)). The Code must detail measures to avoid road use conflicts with sensitive users (school buses etc), behavioural requirements for drivers and vehicle maintenance measures.

***Rail Transport***

The Department has been involved in work with other government agencies aimed at developing a strategic direction for the MGIDS area. As part of this work, cumulative transport impacts from development in the MGIDS area have been considered. It is considered important that an intermodal terminal (road-rail) be established in, or close to, the MGIDS area to handle materials being transported to or from developments in the area. The Upper Hunter is currently serviced by a rail line that has been deemed appropriate for connection to such a terminal. At this stage, such an intermodal terminal is being developed as a concept with an aim to implement the proposal to coincide with the operation of the proposed Hunter Speciality Steels mini steel mill (should it gain approval). The intermodal terminal would have the advantage of being able to accept materials from other parts of the Upper Hunter, thereby reducing traffic movements on the New England Highway. This approach is consistent with the conclusions and recommendations of the *Upper Hunter Cumulative Impact Study and Action Strategy*.

The Applicant has made a commitment to utilise rail transport, through an intermodal terminal, to transport salt to the salt to the site and sodium chlorate to the Port of Newcastle (or other destinations should it prove to be commercially feasible). This commitment is reflected in the recommended instrument of consent, which requires the Applicant to maximise the use of rail transport through any intermodal terminal that may be built in, or in the vicinity of the MGIDS area (conditions 3.20 and 3.21).

## 4.5 Impacts of Waste Production and Management

**Applicant's Position**

***Domestic Waste***

The Applicant indicates that domestic waste generated at the proposed sodium chlorate plant will be disposed of at the Muswellbrook Shire Council Waste Management Centre. Sewage will be directed to the Bayswater Power Station wastewater system.

***Process Waste***

Due to the inherent nature of the process to be employed at the proposed development, the Applicant indicates that ions must be precipitated from the process at a number of points. Precipitation is required for a number of reasons, including final product quality, reduction of ions that may build-up in the process and corrosion control. Precipitates are referred to as "muds" as this waste is handled in a slurry form, which resembles mud. Waste streams constituting muds are detailed in the EIS and summarised below:

- **Brine Treatment Solids** - naturally occurring impurities in the salt used for the production of sodium chlorate (including $Mg^{2+}$ and $Ca^{2+}$) are precipitated with sodium hydroxide and sodium carbonate;
- **Mother Liquor Filter Solids** - solids, including calcium carbonate, magnesium hydroxide and silicate solids are filtered from the mother liquor (the circulating stream from which sodium chlorate is crystallised);
- **Acid Washing Solids** - calcium carbonate and magnesium hydroxide tend to build up on process equipment (electrolytic cells, filters, heat exchangers etc). These solids are periodically washed from the equipment with acid; and
- **Mother Liquor Treatment Solids** - over time, sulfates and perchlorates will tend to build-up in the process. To prevent this build-up, calcium chloride and potassium chloride are added to the process to precipitate the sulfates and perchlorates respectively.

The Applicant indicates that muds from each of the above processes will be directed to a dedicated tank. On a monthly basis, the muds accumulated in the tank will be collected and transported to a hazardous waste management facility in Newcastle for treatment. The Applicant highlights that the muds are classified as industrial waste due to the presence of chromate. All other components of the muds are classified as inert.

Expected composition of the muds at the commencement of operation of the proposed development is provided in the EIS and outlined below. The commencement of an additional perchlorate removal process approximately 2 to 5 years into the operation of the proposed development will add an addition 5% potassium perchlorate to the mud composition.

**Table 14 - Composition of Combined Treatment Solids (Muds)**

| Compound | Fraction of Combined Muds (wt%) |
|---|---|
| Calcium sulfate ($CaSO_4.2H_2O$) | 48.00 |
| Water (as free molecules) | 32.00 |
| Cellulose filter aid | 5.80 |
| Sodium chlorate ($NaClO_3$) | 5.30 |
| Calcium carbonate ($CaCO_3$) | 5.10 |
| Sodium chloride (NaCl) | 1.80 |
| Magnesium hydroxide (MgOH) | 0.99 |
| Iron (III) hydroxide ($Fe(OH)_2$) | 0.89 |
| Calcium chromate ($CaCrO_4.2H_2O$) | 0.30 |

**Issues Raised in Submissions**

The EPA requires that hazardous or industrial waste generated at the proposed development be stored and handled in a manner that minimises its impact on the environment. Further, the proposed development is not permitted to accept waste for processing and must define all waste generated at the plant in accordance with the EPA's guidelines.

It is noted that Council did not raise the issue of waste management in its submission.

Submissions received from the community highlight concern over waste generation and management, particularly "muds" produced at the sodium chlorate plant that contain chromium. A single submission suggests that domestic waste produced at the proposed development may place a significant burden on the Muswellbrook Waste Management Centre.

**Department's Position**

The Department notes that employees at the proposed sodium chlorate plant will generate similar quantities of domestic waste at work as they would at home. There may be limited additional waste produced through office and administrative activities, although this is considered to be a minimal increase above the base domestic waste generation level, particularly given the number of staff on the site (taking into account shifts and proportions of office staff). Domestic waste is not considered to pose a significant additional demand on the Muswellbrook Waste Management Centre.

From the information presented in the EIS it is apparent that the muds generated by the proposed development are generally unavoidable. Further, the bulk of the muds can be considered inert with only 0.39% by mass constituting an industrial waste. The EPA's General Terms of Approval related to waste have been incorporated into the recommended instrument as controls on process waste handling at the proposed development (conditions 3.26 to 3.28 inclusive).

Although the Department is generally satisfied that wastes will not cause a significant environmental impact, it is considered important for the Applicant to take a pro-active approach to the minimisation of waste production on the site. To facilitate this pro-active approach, the recommended instrument of consent requires the preparation of a Waste

Management Plan, detailing how the principles of "reduce, reuse and recycle" will be employed at the sodium chlorate plant (condition 6.5k)).

## 4.6 Socio-Economic Impacts

**Applicant's Position**

***Employment and Investment***

The Environmental Impact Statement notes that the traditional economic base in the Upper Hunter is related to rural industries. In the last two decades these industries have been overtaken (in terms of economics) by the expansion of coal mining and power generation. Despite continued expansion of mining in recent years, the Applicant highlights that the unemployment rate in the region has remained relatively high, at 10.5% (1998).

The Applicant argues that the proposed development will have significant socio-economic impacts on the Muswellbrook and Singleton local government areas. During the 19 month construction period, construction employment will peak at 120persons. The Applicant has indicated a commitment to sourcing construction workers from the local area.

The operation of the proposed sodium chlorate plant will generate 35 employment positions. Initially, management staff from the Applicant's overseas operations will be recruited to establish the development. However, the Applicant states a policy to eventually maximise employment from the local area. The Applicant estimates that in addition to jobs created directly by the proposal, some further 50 jobs may be created through flow-on effects.

The proposed development will involve a capital investment of approximately $95 million. Raw materials required for the production of sodium chlorate will be purchased at a total cost of about $22 million per annum. The Applicant estimates that by 2005, import substitution of sodium chlorate will be in the order of $5 million per annum. Wages paid to employees will amount to approximately $2 million per annum and tax expenses about $2.5 million per annum.

***Community Consultation***

The Applicant indicates that it undertook a series of activities aimed at identifying and addressing community concerns during the preparation of the EIS. These activities included:

- newspaper advertisements providing details of a toll free number and information display from which members of the public could obtain information on the proposed development and voice concerns (*Singleton Argus* and *Muswellbrook Chronicle* on 29 November 2000, *Singleton Argus* on 5 December 2000;
- information displays on the proposed development at the Muswellbrook District Workers Club (29 November 2000) and the Singleton Civic Centre (5 December 2000);
- a newsletter drop of letterboxes in the Ravensworth and Camberwell areas; and
- a briefing on the proposed development to the Muswellbrook Shire Council Environment Committee.

The Applicant suggests that issues of concern expressed by members of the community were collected and addressed in the EIS.

**Issues Raised in Submissions**

Council requested that the recommended instrument of consent require the Applicant to contribute money towards the provision and/ or improvement of community facilities in accordance with section 94 of the *Environmental Planning and Assessment Act 1979*. The recommended condition specified that the quantum of the contributions would be determined by Council under its Section 94 Contributions Plan.

Submissions from the public highlighted displeasure at the lack of community consultation undertaken by the Applicant both prior and during the assessment of the subject development application.

**Department's Position**

The Department recognises that the proposed development will produce significant socio-economic benefits for the Upper Hunter. It is important to note that the proposed development constitutes a broadening of the industrial base of the Upper Hunter from primary industries to include secondary, value-added products. Additionally, The Department considers that the socio-economic benefits will extend to the State and the Nation through import replacement and export generation. The *Upper Hunter Cumulative Impact Study and Action Strategy* suggests that employment in the cattle grazing and cereal crops has declined in recent years and employment in the mining sector is expected to plateau in 2012. The Study also notes that although power generation remains an important employment source, and dairy and wine industries have expanded, a strong, dynamic regional economy is essential for the long-term viabilities of local communities. The Department views the proposed development as being a contribution to that strong, dynamic regional economy.

From the information presented in the EIS, it is noted that the populations of the Muswellbrook and Singleton local government areas totalled 35,699 in 1996 (Muswellbrook 15,564 and Singleton 20,135). Further, the region has experienced an average annual population growth rate of approximately 1.2% since 1961. At this rate, the Muswellbrook and Singleton LGAs are growing by some 428 people per annum (average growth per annum between 1991 and 1996 was 300 people in the Singleton LGA and 87 in Muswellbrook LGA). This growth clearly exceeds the employment generated by the proposed development (approximately 10 times). In the worst case, should all employees for the sodium chlorate plant be sourced from outside the Muswellbrook and Singleton LGAs, the Department considers that the number of people moving to those LGAs specifically to work at the proposed development would be minor compared with annual population growth.

However, the Department recognises the Applicant's commitment to source labour locally. As such, it is most likely that employees for the proposed development will be derived from current unemployment in the area, rather than attracting significant numbers of new employees to the area. Based on these observations, the Department has been unable to establish a clear nexus between the proposed development and an increased demand for public services and infrastructure in the Muswellbrook and Singleton LGAs.

Discussions with Council and the Applicant have indicated that the Applicant may be prepared to contribute to the local community as an active participant in the area. The recommended instrument of consent has been worded, therefore, to facilitate discussions between the Applicant and Council in this regard (conditions 3.24 and 3.25). Although the instrument does not require a specific contribution, it does establish a mechanism for contribution should the Applicant and Council both agree. The Department considers it appropriate to limit any contribution to those that may be otherwise imposed for other industrial developments under Council's established Section 94 Contributions Plan.

***Community Consultation***

The Department has noted concerns raised in submissions that community consultation was insufficient and ineffective. This position is not supported by the Department.

The community consultation program undertaken by the Applicant is considered to be reasonable and targeted at those areas of the community potentially affected by the proposal. Submissions received include input from the towns of Scone, Singleton and Muswellbrook. These areas lie some distance (approximately 40, 30 and 20 kilometres respectively) from the proposed development site and, as established in the EIS and the Department's assessment of the proposal, will at worst experience minimal impacts as a result of the sodium chlorate plant.

To ensure on-going community consultation, the recommended instrument of consent requires the Applicant to establish a Community Consultative Committee (conditions 5.4 to 5.7) . The Committee is to include community representatives from the local area and provide a mechanism for community representatives to voice concerns and be involved in the environmental management process for the proposed development. The instrument also provides a mechanism of the Applicant's Community Consultative Committee to be combined

with any other similar committee for future development in the MGIDS area and/ or with the existing forum for Macquarie Generation's power stations.

The Department considers that the recommended instrument of consent provides appropriate means for effective on-going community consultation.

## 4.7 Impacts on Flora and Fauna

**Applicant's Position**

The Environmental Impact Statement highlights that the MGIDS area is almost totally cleared of vegetation and is characterised by open grassland and sparse understorey plants in isolated stands. It is suggested in the EIS that because the area is so highly modified, it is considered to offer low potential for use by indigenous fauna. Although the lack of continuous canopy and tree hollows makes the area unsuitable for tree-dwelling species, a number of terrestrial species have been recorded on the site in the past (Short-beaked Echidna, Eastern Grey Kangaroo, Common Wallaroo, Common Wombat and the Common Brushtail Possum). Eleven distinct species of bat have also been recorded in the vicinity of the MGIDS area in recent years.

Permanent waterbodies associated with the Bayswater and Liddell Power Stations (Lakes Liddell and Plashett and Freshwater Dam) in the MGIDS area provide appropriate habitat for avifauna, microbenthos and some species of herptofauna. The EIS indicates that approximately 135 species of birds have been recorded using these waterbodies. Fourteen species of reptiles and 12 frog species have also been recorded in the area in the past. Of note is the siting of Green and Golden Bell Frogs (*Litoria aurea*) in sewage polishing ponds to the east of Bayswater Power Station in 1994/95.

Surveys of the proposed development site undertaken by the Applicant indicate that site is almost exclusively dominated by grasses. The presence of two haloes of *Acacia salicinia* is considered significant as they represent the bulk of the remaining vegetation on the site. The EIS states that the site is generally devoid of suitable habitat, as is the retention pond at the northern end of the site as it lacks emergent vegetation. Evidence was found of use of the site by the Eastern Grey Kangaroo (*Macropus giganteus*) for feeding. Bird species, namely Richard's Pipits (*Anthus novaeseelandiae*) and Pied Butcherbird (*Cracticus nigrogularis*) were also observed on the site. The Applicant suggests that given the open, flat nature of the site, these species would most likely only use the site for occasional feeding. The Applicant suggests that other areas of the MGIDS area would be more suitable for feeding and for use as habitat, and the loss of the proposed development site would not significantly reduce potential feeding, breeding or habitat areas.

The EIS lists that three vulnerable bird species have been recorded within ten kilometres of the proposed development site (the Freckled Duck (*Sticonetta naevosa*), Barking Owl (*Ninox connivens*) and Australasian Bittern (*Botarus poiciloptilus*)). Several vulnerable mammale species have also be recorded in the region, including the Common Bent-Wing Bat, Large Footed Myotis and Eastern False Pipistrelle. In accordance with section 5A of the *Environmental Planning and Assessment Act 1979*, the "8-Part Test" was applied to threatened/ vulnerable species and presented in the EIS. The EIS concludes from the results of the Test that there will not be a significant impact on any threatened species, populations and ecological communities or their habitats.

Sodium chlorate is a known herbicide and defoliant. The Applicant considers that emissions of sodium chlorate from the proposed development will not be sufficient to cause a significant impact on local vegetation. Any impact would be easily identifiable as sodium chlorate applied to or absorbed by vegetation is sub-lethal doses produces mottling along with chlorosis and overall stunted growth. Sodium chlorate is not known to accumulate in animals, but may be absorbed through plant surfaces and roots. It also breaks down in the environment, particularly in warm and moist areas conducive to the growth of bacteria that break down the compound. Given the predicted duct deposition rates provided by dispersion modelling, the limited extent of significant vegetation in the MGIDS area and the generally

warm climate of the Upper Hunter, the Applicant suggests that bioaccumulation and herbicidal effects on vegetation would be negligible.

**Issues Raised in Submissions**

The National Parks and Wildlife Service indicated in its submission that did not have any comments in relation the proposed development.

Submission received from the public raised concerns that sodium chlorate dust from the development may have a negative impact on local vegetation as it acts as a herbicide/ defoliant. Two submissions suggested that a Species Impact Statement should have been prepared for impacted species, particularly the Green and Golden Bell Frog and the Barking Owl.

**Department's Position**

The Department supports the Applicant's position that the proposed development site and the MGIDS area in general represent degraded habitat with no outstanding significance in terms of flora or fauna. However, the haloes of *Acacia salicina* are required to be kept (condition 3.30). The Landscape Management Plan (condition 6.5j)) required by the recommended instrument of consent is to be implemented by the Applicant with a focus on re-establishing endemic flora species on the site.

Claims made in submissions that the Applicant should have prepared Species Impact Statements (SIS) are not support. The Applicant has applied the 8-Part Test to relevant species, populations, communities and habitats, and determined that there will not be any significant impact. The Department concurs with this conclusion, and therefore does not support the need for a detailed SIS.

To ensure that the Applicant's assertions that the proposed development will not have a significant impact on local vegetation, the recommended instrument requires the preparation and implementation of a Vegetation Monitoring Program (condition 4.6). The Program must provide for regular monitoring to identify any mottling, chlorosis or stunted growth. This will provide an early warning of any impacts from the sodium chlorate plant and initiate additional mitigating measures.

## 4.8 Impacts on Visual Amenity

**Applicant's Position**

The Applicant suggests that the local topography affords limited views of the proposed development site. In particular, only limited views of the site are provided from the New England Highway, an impact that is further reduced by the 100 kilometre per hour speed limit on that road. The site may be clearly viewed from the internal road network in the MGIDS area, however the EIS highlights that there is not public access to those roads.

The location of the Bayswater and Liddell Power Stations in close proximity to the proposed development site are considered by the Applicant to outweigh the sodium chlorate in terms of bulk and potential visual impacts.

**Issues Raised in Submissions**

The Department did not receive any submissions that raised visual amenity issues.

**Department's Position**

Representatives of the Department have inspected the proposed development site on two separate occasions. From these inspections the Department concurs with the Applicant's conclusion that the proposed development will have a minimal impact on visual amenity. The bulk of the power stations is likely to afford some "blending" effect and tend to overshadow any impacts that the sodium chlorate plant may have on local views.

The Landscape Management Plan required under the recommended instrument of consent (condition 6.5j)) will mitigate any visual amenity impacts further, through appropriate screening with vegetation.

## 4.9 Noise Impacts

**Applicant's Position**

The Applicant did not supply any consideration of noise impacts during construction of the proposed sodium chlorate plant. This position is justified with the observation that the development site is some five kilometres from the nearest residential receptor.

The Environmental Impact Statement presents modelling of noise impacts from the proposed development on the closest residential receivers (approximately five kilometres from the site). Based on this modelling, the Applicant states that under the worst meteorological conditions, the proposed development will generate a 10 to 15 dB(A) noise impact on the closest receivers. The Applicant argues that this noise impact would be imperceptible under even the quietest conditions. Further, the noise impact would be so low as to not contribute in any noticeable manner to cumulative noise impacts in the area.

The Applicant undertook modelling to estimate the traffic noise impacts associated with the development along the New England Highway (north and south of the clover-leaf intersection access to the MGIDS area, and during morning and afternoon peak periods). The results of that modelling are summarised below. All noise levels represent $L_{A10}$ data (noise exceeded 10% of the time)

**Table 15 - Traffic Noise Impacts**

| Location | Peak Period | Current Traffic Noise (dB(A)) | Added Traffic Noise (dB(A)) |
|---|---|---|---|
| North of Clover-Leaf Intersection | Morning | 62.40 | 62.41 |
| | Afternoon | 63.47 | 63.49 |
| South of Clover-Leaf Intersection | Morning | 63.30 | 63.33 |
| | Afternoon | 64.05 | 64.11 |

The Applicant highlights that traffic associated with the proposed sodium chlorate will have a barely noticeable effect on existing traffic noise, as can be seen from the table above.

**Issues Raised in Submissions**

The EPA included, as part of its General Terms of Approval, restrictions on the permissible hours of construction for the proposed development.

Council requested that the instrument of consent include a requirement for noise monitoring, should the Minister determine to approve the development application.

The Department did not receive any other submissions that raised noise impacts from the proposed sodium chlorate as being of concern.

**Department's Position**

The Department supports the Applicant's position that detailed assessment of construction noise impacts is not required, given the isolation of the development site. It is noted that the EPA has supplied General Terms of Approval restricting the hours of construction for the proposal, presumably to minimise construction noise impacts. The Department does not concur with the EPA's position in this regard and considers that the provisions of the subject General Term may be redundant in relation to noise impacts. However, restrictions to construction hours are seen as appropriate means to restrict the movement of heavy vehicles associated with construction activities and minimise construction traffic impacts. The General Term has therefore been incorporated into the recommended instrument of consent.

Negligible noise impacts from the operation of the proposal have been noted, as has the absence of General Terms of Approval from the EPA in relation to operational noise. The *Upper Hunter Cumulative Impact Study and Action Strategy* highlights noise creep as being an issue that should be addressed in the assessment of developments in the Upper Hunter. The Department is satisfied that the Applicant has adequately demonstrated that operational noise impacts will not exacerbate noise issues in the Upper Hunter. Council's request for on-

going noise monitoring is therefore not supported and is considered overly onerous. The recommended conditions of consent supplied by Council in relation to noise have not been included in the instrument of consent for this reason.

The Department concurs with the Applicant's assessment of predicted traffic noise impacts. There will be a negligible increase in traffic noise as a result of the proposed development, and as such there are no specific provisions related to traffic noise in the recommended instrument of consent.

## 4.10 Impacts on Heritage Items

**Applicant's Position**

The Applicant notes that a number of items of non-indigenous heritage are listed in environmental planning instruments for the Upper Hunter Region. However, it is highlighted that none of these items occur on, or in the vicinity of, the development site. The Applicant suggests that ut would be highly unlikely to discover a non-indigenous heritage item on the development site, given its history (as land originally cleared for grazing rather than settlement) and its highly disturbed nature.

In a similar manner, the Applicant considers it unlikely that items of indigenous significance could be located on the site. A survey of the proposed development site was undertaken by the Applicant, accompanied by a representative of the Local Aboriginal Land Council. This survey concluded that the site was too disturbed to represent significant potential for discovery of aboriginal relics. The survey also noted that some items, including stone flakes may be located along nearby waterways, such as Tinkers Creek. The Applicant has indicated that land adjacent to watercourses will not be disturbed during the construction or operation of the proposed sodium chlorate plant.

**Issues Raised in Submissions**

The Department did not receive any submissions that raised concern in relation to the impacts of the proposed development on heritage items. In particular, it is noted that the National Parks and Wildlife Service did not raise indigenous heritage in its submission.

**Department's Position**

The Department concurs with the Applicant's conclusions that the location of any heritage item, aboriginal or non-indigenous, on the site is unlikely. Given the disturbed nature of the proposed development site, the Department does not consider it necessary to impose specific conditions of consent to mitigate impacts on heritage items.

# 5. CONSIDERATION OF ISSUES RAISED IN SUBMISSIONS

The Department received a total of 16 submissions in response to the exhibition of the Environmental Impact Statement and development application for the proposed sodium chlorate plant.

Six submissions were received from State government authorities, two of which are integrated approval bodies for the development (Environment Protection Authority and Department of Land and Water Conservation). Only the Newcastle Port Corporation expressed support in its submission. All other submissions received from authorities did not explicitly state support or opposition for the proposal.

A submission was received from Muswellbrook Shire Council, being the council for the local government area in which the sodium chlorate plant is proposed. The Department supplied copies of the Environmental Impact Statement to Singleton Shire Council and invited comment on the proposal, as the development site lies close to the Muswellbrook-Singleton local government boundary. However, the Department did not receive a submission or comment on the proposal from Singleton Shire Council.

A total of 8 submissions were received from private individuals or groups. Six of those submissions stated objection to the proposed development. Two submissions did not clearly state support or objection to the proposal, however the Department has assumed objection based on the tone of the submission.

A summary of the major issues raised by each of these parties is provided below, with full details of each submission provided as Appendix C. It should be noted from the information provided in Appendix C that five submissions were received after the conclusion of the exhibition period, including one from a State Government agency, one from a council and three from private individuals. The Department considers that it has exceeded the requirements of the Act in relation to receipt and consideration of submissions. There is no basis for the belief that any party has not been afforded every opportunity to comment on the proposal, or disadvantage in any manner during assessment of the proposal.

## 5.1 Submissions from Authorities

In response to the exhibition of the subject development application, the Department received submissions from 6 authorities listed below.

- Environment Protection Authority (integrated approval body);
- Department of Land and Water Conservation (integrated approval body);
- National Parks and Wildlife Service;
- Roads and Traffic Authority;
- Newcastle Port Corporation; and
- NSW Fire Brigades.

Only the Newcastle Port Corporation stated that it supports the proposed development. All other authorities remained silent on the issue, neither stating support nor objection. A summary of the submissions received from authorities is provided below. Each of the relevant issues has been considered in detail as part of the Department's assessment of respective environmental impacts (refer to section 4 of this report).

The Department is satisfied that it has duly considered the issues raised in submissions received from authorities.

**Environment Protection Authority**

The EPA did not provide any specific comments in relation to the proposed development or associated environmental impacts. It did however provide a list of General Terms of Approval for incorporation into an instrument of consent, should the Minister determine to approve the development application. The scope of the EPA's General Terms of Approval is summarised below.

- discharge concentration limits for release of solid particles, chlorine and hydrogen chloride to the atmosphere;
- prohibition of processing or treating wastes at the proposed development and a requirement to classify all wastes generated on the site in accordance with the EPA's guidelines;
- restrictions on hours of construction;
- requirements to minimise the emission dust from the site and dust-generating loads transported to and from the site;
- requirements to prepare and implement stormwater/ sediment control schemes during construction and operation;
- monitoring requirements for emissions to air, including physical parameters, gaseous compounds and particulates; and
- monitoring programs for meteorology, vegetation, groundwater and surface water.

These General Terms of Approval have been incorporated into the recommended instrument of consent. Specific comment in relation the General Terms has been provided in the respective sections of this report (from section 4.1 to section 4.10). The Department considers that it has duly considered the EPA's position in relation to the proposed development.

**Department of Land and Water Conservation**

The Department of Land and Water Conservation provided some comments in relation stormwater control infrastructure requirements, the scope of Macquarie Generation's Part 9 licence and advice in relation to watercourse stability in the vicinity of the proposed development site. DLWC did not, however, provide any specific comments in relation to its assessment of the proposal development or associated environmental impacts. The submission received from DLWC included a list of General Terms of Approval for incorporation into an instrument of consent, should the Minister determine to approve the development application. The scope of DLWC's General Terms of Approval is summarised below.

- measures to minimise the potential for erosion and sedimentation associated with the proposed development;
- requirements for the location, operation and maintenance of groundwater monitoring bores;
- details of matters that must be considered in a Groundwater Monitoring Program;
- a requirement for the Applicant and Macquarie Generation to establish a water supply agreement in accordance with the Site Management Plan under Macquarie Generation's Part 9 licence; and
- the scope of an Erosion and Sediment Control Plan that must be prepared and implemented by the Applicant.

These General Terms of Approval have been incorporated into the recommended instrument of consent. Specific comment in relation the General Terms has been provided in the respective sections of this report (from section 4.1 to section 4.10). The Department considers that it has duly considered the EPA's position in relation to the proposed development.

**National Parks and Wildlife Service**

The National Parks and Wildlife Service (NPWS) indicated that it had no comment on the proposed development. NPWS did not raise flora and fauna issues (including any need for a Species Impact Statement) or aboriginal heritage issues as being of concern in relation to the proposal.

**Roads and Traffic Authority**

The Roads and Traffic Authority (RTA) stated in its submission that it raised no objection to the proposed development, based on impacts on the New England Highway. It recommended that Council's position in relation to impacts on local roads be sought.

**Newcastle Port Corporation**

The Newcastle Port Corporation indicated that the Port has the capability to handled sodium chlorate (a class 5.1 material) provided it complied with relevant transport handling safety codes.

**NSW Fire Brigades**

The NSW Fire Brigades supported the preparation of a Fire Safety Study for the proposed development and the implementation of a strict maintenance schedule for all essential services and other safety measures. The Brigades welcomed the Applicant's invitation to attend a briefing on the development and its hazards.

## 5.2 Submissions Made by Councils

In response to the exhibition of the subject development application, the Department received a submission from Muswellbrook Shire Council supporting the proposed development. Council's submission did not specify the basis for its support, but did indicate that the support was conditional on a number of issues being addressed through an instrument of consent, should the Minister determine to approval the development application. Conditions of consent recommended by Council are summarised below.

- a requirement to prepare and implement an Erosion and Sediment Control Plan, and details of the scope of such a Plan;
- a requirement to implement a program to monitor surface water quality;
- a suggestion that noise impacts should be monitored at the nearest affected residence during the first year of construction and the first year of operation to verify the predicted noise impacts presented in the EIS;
- a program to monitor air quality;
- a requirement that all parking and access roads meet the requirements of Council's Development Control Plan No. 1 - Off-Street Parking;
- annual reporting requirements in relation to environmental performance;
- mechanisms for community consultation and receiving complaints;
- a requirement to provide monetary contributions to Council in accordance with section 94 of the *Environmental Planning and Assessment Act 1979*; and
- preparation and implementation of an emergency plan for the proposed development.

Singleton Shire Council was invited to comment on the proposed development as it is likely to have an impact on the Singleton local government area. The Department did not, however, receive a submission from that council. All issues raised by local government bodies have been appropriately considered as part of the Department's assessment of the proposal.

## 5.3 Submissions Made by the Public

The Department received submissions from six members of the public and three from groups. A summary of issues raised in these submissions is provided below.

- air quality impacts - concern was raised about cumulative air quality issues in the Upper Hunter, including dust deposition and the potential for synergistic effects. The potential for health impacts from the inhalation or ingestion of air emissions and sodium chlorate dust highlighted as being of significant concern;
- hazards and risk impacts - submissions highlighted that the transport of dangerous goods was an issue, as was the potential for toxic compounds to be released from the development during fires. A submission raised the issue of hydrogen explosions and the potential for the Bayswater Power Station to be affected;
- water quality impacts - supply of water to the proposed development was raised in a number of submissions and the availability of that water. Potential releases of contaminants that could impact on the Hunter River was highlighted as being an important issue;
- transport impacts - cumulative traffic impacts, particular through towns along the New England Highway was raised in a number of submissions;
- waste generation - members of the public were concerned at the designation of waste from the proposed development as "industrial waste";
- community consultation - some submissions suggested that the Applicant did not undertake adequate community consultation during the preparation of the EIS and that community concerns were not addressed; and
- threatened species and defoliation - concern was raised that sodium chlorate deposition could lead to widespread defoliation and impact on vulnerable species (both flora and fauna).

The Department is satisfied that all issues raised in submissions received from the public have been duly considered. It should be noted that a number of submissions were received after the close of the exhibition period. In this regard, the Department believes that it has provide reasonable opportunities for all concerned members of the public to state issues of concern in relation to the proposed development.

## 5.4 Consultation with the Applicant

The Applicant has been supplied with a copy of the draft instrument of consent. Comments made by the Applicant have been given due consideration. The recommendations of the aforementioned authorities and the Applicant's requested alterations to the conditions of the instrument of consent have been reconciled to produce conditions to the satisfaction of the Department.

## 6. SECTION 79C CONSIDERATION

Section 79C of the *Environmental Planning and Assessment Act 1979* sets out matters that a consent authority must take into consideration when it determines a development application. The Department has assessed the development application in the context of Section 79C of the Act, having regard to the identified heads of consideration. This consideration is provided in Appendix B. The Department is satisfied that the merits of the proposed development warrant approval subject to the recommended instrument of consent.

## 7. RECOMMENDED CONDITIONS OF CONSENT

The recommended instrument of consent is attached (tagged "A"). The draft conditions take into account the issues raised in submissions from the public, authorities and councils.

The conditions of consent have been drafted with the aims of controlling and monitoring the future environmental performance of the sodium chlorate plant. In addition, conditions have been recommended to provide a mechanism for coordination of environmental management in the Macquarie Generation Industrial Development Strategy Area, with the purpose of reducing potential cumulative environmental impacts to as low as reasonably possible. Key issues covered by the conditions include:

- **air quality** - discharge limits have been imposed on the proposed development in relation particulates (sodium chlorate), chlorine and hydrogen chloride. The Applicant is also required to install a meteorological station, should it be unable to gain access to data from an existing station operated by Macquarie Generation;
- **water quality** - the Applicant is required to meet the requirements of DLWC relating to the sinking, design and location of groundwater monitoring bores. An agreement between the Applicant and Macquarie Generation for the supply of water under Macquarie Generation's Part 9 licence must also be reached. The recommended instrument requires the agreement to detail volumes of water to be supplied, arrangements for monitoring water consumption, water storage arrangements and water disposal arrangements;
- **hazards and risk** - all dangerous goods to be stored on the site are required to be fully bunded. A suite of hazards studies is required to address hazards and risk impacts during construction, fire safety issues, design safety, emergency planning and on-going safety management. The Applicant is also required to establish an Emergency Services Coordination Agreement with relevant emergency services to establish areas of cooperation and communication between the Applicant and those services;
- **traffic and transport** - the Applicant must utilise rail transport to the greatest extent practicable, should an intermodal terminal be constructed on, or in the vicinity of the MGIDS area. To address potential road transport impacts, the recommended instrument of consent requires the preparation of a Transport of Hazardous Materials Study and a Transport Code of Conduct;
- **monitoring** - monitoring must be undertaken in relation to air quality impacts, the impacts of sodium chlorate deposition on vegetation, meteorological conditions in the vicinity of the development and water quality impacts (surface water and groundwater);
- **reporting** - the Applicant must report all hazardous and environmental incidents. An annual must be produced to detail the environmental performance of the development and compliance with the conditions of consent;
- **auditing** - an environmental audit and a hazard audit of the sodium chlorate plant must be undertaken every three years;
- **community involvement** - the Applicant is to develop a community complaints procedure and a Community Consultative Committee to ensure on-going community involvement with the environmental management of the proposed sodium chlorate plant;
- **environmental management** - construction and operation environmental plans are to be prepared for the sodium chlorate plant. These plans cover areas including air quality, energy management, groundwater impacts, water management (surface water, process water, stormwater), landscaping and waste management; and
- **cumulative impacts** - the recommended instrument of consent includes provisions to encourage consideration and coordination of environmental management in the MGIDS area.

As highlighted in section 5.4, all relevant parties are satisfied with the draft instrument of consent and the scope and intent of the conditions. The Department considers that the recommended instrument of consent will mitigate the environmental impacts of the proposal to an appropriate and acceptable level.

## 8. CONCLUSIONS

The Department of Urban Affairs and Planning considers that the proposed development is consistent with State and regional planning objectives. The development application accords with the objectives and provisions of regional and local planning instruments.

The Department considers that all key environmental concerns have now been adequately addressed. It is recommended that the development application be approved subject to the conditions of the recommended instrument of consent. Conditions have been formulated to manage, monitor and mitigate potential environmental impacts.

## 9. RECOMMENDATIONS

It is RECOMMENDED that the Minister:

(i) consider the findings and recommendations of the Department's Assessment Report for DA No. 71-04-01 (this document, tagged "B");
(ii) grant consent to development application No. 71-04-01, as submitted by Sterling Pulp Chemicals Ltd, subject to the conditions set out in the instrument of consent (tagged "A"); and
(iii) sign the instrument of consent (tagged "A").

Scott Jeffries
Major Hazards Specialist
**Development and Infrastructure Assessment**

ENDORSED:

Gordon Kirkby
Team Leader, Manufacturing and Rural Industries
**Development and Infrastructure Assessment**

Sam Haddad
Executive Director
**Sustainable Development**

## APPENDIX A - PROVISIONS OF ENVIRONMENTAL PLANNING INSTRUMENTS

Follow are considerations of the proposed sodium chlorate plant in the context of the objectives and provisions of relevant environmental planning instruments.

### STATE ENVIRONMENTAL PLANNING POLICY NO. 34 - MAJOR EMPLOYMENT-GENERATING INDUSTRIAL DEVELOPMENT

**Aims of the Policy**

*State Environmental Planning Policy No. 34*, gazetted on 26 March 1993 aims to:

***a) promote and coordinate the orderly and economic use and development of land and economic welfare of the State;***

The proposed sodium chlorate plant is to be located on land to which *State Environmental Planning Policy No. 67 - Macquarie Generation Industrial Development Strategy* applies. By determining that the SEPP applies to the proposed development (by including the proposal in a Schedule to the SEPP), it has been established that the sodium chlorate plant represents an appropriate (orderly and economic) use of land within the MGIDS area. In relation to the promotion of the economic welfare of the State, the Department notes that the proposal will involve a capital investment of $95 million and will create 35 full-time jobs. The Environmental Impact Statement indicates that the development will generate export earnings for the State and the Nation, and will provide import substitution opportunities. The Department considers that the proposed development is economically significant for the region, the State and the Nation.

***b) facilitate certain types of major employment-generating industrial development of State significance;***

The proposed sodium chlorate plant will generate employment positions for 35 people during operation. The proposal will also require a capital investment of approximately $95 million which, through flow-on economic effects, will contribute to the creation and maintenance of additional employment in the local government area, the region and the State. The Department considers the proposed sodium chlorate plant constitutes a development of State and regional planning significance.

***c) facilitate the carrying out of labour intensive rural industrial development of State significance;***

This aim is not relevant to the proposed development.

***d) achieve appropriate planning controls in respect of such development;***

The Department considers that the proposed sodium chlorate plant is not inconsistent with existing environmental planning instruments applicable to the development site. Further, through the imposition of conditions detailed in the recommended instrument of consent, the Department is satisfied that appropriate additional controls will be implemented to ensure adequate mitigation and management of environmental impacts associated with the proposal.

***e) provide for public participation and involvement in the assessment of applications for consent to carry out such development.***

The subject development application has been notified and exhibited in accordance with the Act and Regulation. In assessing the proposed development, the Department has had due regard to the matters raised in the 16 submissions received in response tot he exhibition of the subject development application. Consideration of the issues raised is provided in sections 4 and 5 of this report.

**Provisions of the Policy**

***a) Nothing in this Policy authorises the carrying out of a development if the carrying out of the development is not otherwise permitted, whether with or without development consent.***

The proposed development is permissible with consent, in accordance with *State Environmental Planning Policy No. 67 - Macquarie Generation Industrial Development Strategy*.

***b) The provisions of Sections 84, 85, 86, 87(1) and 90 of the Act apply to and in respect of development (not being designated development) to which this policy applies in the same way as those provisions apply to and in respect of designated development.***

Sections 84, 85, 86, 87(1) and 90 referred to SEPP 34 are references to those sections in the unamended Act. Equivalent sections in the amended Act relate to notification and exhibition of a development application, receipt of submissions and matters that a consent authority must consider in determining a development application. As detailed in sections 3, 5 and 6 of this report, the requirements of the amended Act in relation to notification, exhibition, submissions and consideration of environmental planning matters have been fully met.

***c) The consent authority must give notice to a council of any application for consent to carry out any development to which this Policy applies which is proposed to be carried out in the council's area.***

The Department formally advised Muswellbrook Shire Council of the receipt of the subject development application, being a development to be located within the Cessnock local government area, by written correspondence dated 20 April 2001.

**d)** ***The notice is to invite the council to make a submission to the consent authority in respect of the application and is to specify the manner in which and the period, being not less than 30 days, during which a submission may be made.***

The notification to Council provided details of the exhibition period (of at least 30 days duration) and invited Council to comment on the proposal, should it wish.

***e) In determining an application for consent to the carrying out of a development to which this Policy applies, the consent authority must consider any submissions made pursuant to Clause 10 or 11.***

In assessing the proposed development, the Department has had due regard to the matters raised in the 16 submissions received in response tot he exhibition of the subject development application. Consideration of the issues raised is provided in sections 4 and 5 of this report.

**STATE ENVIRONMENTAL PLANNING POLICY NO. 67 - MACQUARIE GENERATION INDUSTRIAL DEVELOPMENT STRATEGY**

**Aims of the Policy**

*State Environmental Planning Policy No. 67*, gazetted (by special Gazette) on 12 April 2001 aims to:

***a) promote and coordinate the orderly and economic development of certain lands in the local government areas of Muswellbrook and Singleton (the Macquarie Generation Buffer Land);***

The proposed sodium chlorate plant is to be located on land to which *State Environmental Planning Policy No. 67 - Macquarie Generation Industrial Development Strategy* applies. By determining that the SEPP applies to the proposed development (by including the proposal in a Schedule to the SEPP), it has been established that the sodium chlorate plant represents an appropriate (orderly and economic) use of land within the MGIDS area. In relation to the promotion of the economic welfare of the State, the Department notes that the proposal will

involve a capital investment of $95 million and will create 35 full-time jobs. The Environmental Impact Statement indicates that the development will generate export earnings for the State and the Nation, and will provide import substitution opportunities. The Department considers that the proposed development is economically significant for the region, the State and the Nation.

***b) facilitate the carrying out of certain types of industrial development of State significance within the Macquarie Generation Buffer Land with a strong commitment to sustainable environmental performance;***

The proposed sodium chlorate plant will generate employment positions for 35 people during operation. The proposal will also require a capital investment of approximately $95 million which, through flow-on economic effects, will contribute to the creation and maintenance of additional employment in the local government area, the region and the State. The Department considers the proposed sodium chlorate plant constitutes a development of State and regional planning significance.

The Department considers that commitments provided in the Environmental Impact Statement, and the recommended instrument of consent, provide a framework for the operation of an environmentally sustainable development.

***c) enable public involvement and participation in the assessment of applications for consent to carry out this development.***

The subject development application has been notified and exhibited in accordance with the Act and Regulation. Issues raised in public submissions have been duly considered as part of the Department's assessment of the proposed development.

**Additional Matters to be considered by the consent authority**

In determining a development application, the consent authority must take into consideration such of the following matters as are of relevance to the development the subject of the development application:

***a) the cumulative air and other environmental impacts of the development and any other development (including the power stations) on the land to which this Policy applies;***

Cumulative impacts associated with the proposed development, and other developments in the region (including the power stations) have been considered as part of the Department's assessment of the subject development application. Consideration of cumulative impacts is provided under assessment of relevant environmental impacts provided in section 4 of this report.

***b) the minimisation of truck movements and the feasibility of utilising transport by rail;***

The Department considers that the proposed development will not have a significant environmental impact in relation to traffic and transport. However, it is considered appropriate to maximise the use of rail transport to avoid future cumulative impacts and heavy vehicle "creep". As such, the recommended instrument of consent requires the Applicant to maximise the use of rail transport in the event that an intermodal terminal commences operation in, or in the vicinity of, the MGIDS area.

***c) the efficiency of the utilisation of resources, including energy, water and raw materials;***

Efficiency of resource utilisation is considered to be particularly important as it relates to water and energy consumption. These impacts have been considered in sections 4.3 and 4,1 of this report, respectively. The Applicant is required to prepare and implement a Water Management Plan to detail water consumption minimisation measures. In relation to energy consumption, the recommended instrument of consent requires the preparation of an Energy Management Plan, and a Hydrogen Substitution Strategy to minimise and offset energy consumption, respectively.

***d) the minimisation and management of waste;***

The Applicant is required to prepare and implement a Waste Management Plan for the proposed development. The Plan is to consider domestic waste generation as well as process waste issues (muds).

***e) the minimisation of visual impacts, including the restoration of native vegetation;***

The proposed development will generally not be visible from public places. Further, any impacts of the sodium chlorate in this regard will be absorbed by the bulk of the Bayswater and Liddell Power Stations. The proposed development site is largely devoid of vegetation. However, the recommended instrument of consent requires the preparation and implementation of a Landscape Management Plan to ensure that appropriate revegetation measures are undertaken using endemic species.

***f) the likely effects of the development on local and regional societies and economies;***

The Department considers that the proposed development will have a positive impact on the regional economy through generation of 35 full-time employment positions and investment of $95 million in capital. From its assessment, detailed in section 4.6 of this report, the Department has not identified a nexus for the imposition of contributions under section 94 of the *Environmental Planning and Assessment Act 1979*.

***g) any submissions made to the consent authority concerning the development by any member of the public.***

In assessing the proposed development, the Department has had due regard to the matters raised in the 16 submissions received in response tot he exhibition of the subject development application. Consideration of the issues raised is provided in sections 4 and 5 of this report.

**HUNTER REGIONAL ENVIRONMENTAL PLAN 1989**

**Aims of the Plan**

The *Hunter Regional Environmental Plan 1989* aims to:

***a) promote the balanced development of the region, the improvement of its urban and rural environments and the orderly and economic development and optimum use of its land and other resources, consistent with conservation of natural and man made features and so as to meet the needs and aspirations of the community;***

The Department notes that the Upper Hunter Region is characterised by agricultural, coal mining and electricity generation. The proposed sodium chlorate plant represents a diversification of the regions employment base, and as such also represents a "development balance" for the region. Through its assessment of the proposed development, the Department has established that the sodium chlorate plant would be consistent with conservation of natural and man-made features of the development site and the MGIDS area.

The proposal is a development to which SEPP 67 applies. The sodium chlorate plant has been determined to be an orderly and economic use of land within the MGIDS area. The MGIDS area is currently under-utilised, having potential for the location of appropriate energy-intensive development. The sodium chlorate plant is therefore an optimisation of the use the subject development site.

***b) coordinate activities related to development in the region so there is optimum social and economic benefit to the community;***

The proposed development will have significant positive impacts on employment and local investment. The Department considers that there may be down-stream industries developed in the area, either to accept products from the sodium chlorate plant, or to act in an "industrial ecology".

***c) continue a regional planning process that will serve as a framework for identifying priorities for further investigations to be carried out by the Department and other agencies.***

The Department has undertaken an environmental impact assessment of the proposed development in accordance with the requirements of the Act and the Regulation. As part of that assessment, regional issues were considered, in particular cumulative air quality issues. Based on the conclusions presented in this report, the Department does not consider that there are significant regional issues associated with the proposal that require further investigation.

**Provisions Relating to Industrial Development**

The objectives of the Plan in relation to planning strategies concerning industrial development are to:

***a) ensure that sufficient zoned and serviced industrial land is provided in locations appropriate to the needs of industry, while ensuring protection of the environment;***

The proposed sodium chlorate plant will not be located on land currently zoned for industrial purposes. As such, the subject development application will not lead to a decrease in zoned and serviced land in locations appropriate to the needs of industry. The proposed development is a "special" case to which SEPP 67 applies and has been deemed to be appropriate for location in the MGIDS area.

***b) promote the distribution of employment in secondary industry in a manner compatible with the availability of services and distribution of population.***

The proposed development will generate 35 full-time employment positions. The Applicant has indicated that most staff will be sourced locally, and therefore there will be a negligible increase in the demand for services about current levels.

In relation to industrial development, the consent authority should:

***a) ensure that an adequate supply of zoned and serviced industrial land is available in appropriate locations to meet needs, taking into account the extensive nature of modern industrial and quasi-industrial development;***

The proposed sodium chlorate plant will not be located on land currently zoned for industrial purposes. As such, the subject development application will not lead to a decrease in zoned and serviced land in locations appropriate to the needs of industry. The proposed development is a "special" case to which SEPP 67 applies and has been deemed to be appropriate for location in the MGIDS area.

***b) ensure that waterfront industrial land is retained for industries requiring waterfront access;***

The proposed development will not occupy waterfront land and will therefore not jeopardise the use of such land by those industries that may require access to water.

***c) in consultation with the Environment Protection Authority, identify sites for hazardous or offensive industries in appropriate locations, taking into account*** **State Environmental Planning Policy No. 33 - Hazardous and Offensive Development.**

In accordance with SEPP 33, the proposed sodium chlorate plant is "potentially hazardous" and "potentially offensive", but not "hazardous" or "offensive". The Department, in consultation with the EPA, has determined that the risk and offence impacts of the proposal can be adequately mitigated and managed through the recommended instrument of consent and the Environment Protection Licence.

**Provisions Relating to Transport**

A consent authority should not grant consent to the carrying out of a development involving:

***a) the storage or handling of goods or materials which are likely to be delivered by heavy transport vehicles, unless it has considered whether use could be made of a transport mode other than road which, in the opinion of the consent authority, is economically practicable;***

The recommended instrument of consent requires the Applicant to maximise the use of rail transport, should an appropriate intermodal terminal commence operation in, or in the vicinity of the MGIDS area.

***b) land having a frontage to a main or arterial road unless all vehicular access to the land is from a road other than a main or arterial road, where practicable, or the consent authority is satisfied that the applicant has demonstrated that there will not be any adverse effect on traffic movement in the area as a result of the development.***

The proposed development site is serviced by a private road network within the MGIDS area. This network is connected directly to the New England Highway via a clover-leaf intersection, which the Department has assessed to have adequate capacity to accommodate vehicle movements associated with the proposed development.

**Objectives Relating to Pollution Control**

A consent authority should not grant consent to the carrying out of a development listed in Schedule 3 of the *Environmental Planning and Assessment Regulation 1980* (including development comprising the expansion of an existing facility) unless it is satisfied that:

***a) topographic and meteorological conditions are such that air pollutants would have no significant adverse effect;***

Air pollutant dispersion modelling undertaken by the Applicant included consideration of topographic and meteorological conditions in the area. Results of the modelling indicate that there will be no adverse air quality impacts associated with the proposed development's operation.

***b) an appropriate buffer zone can be provided to ensure that noise, dust and vibration are maintained at acceptable levels;***

The Department is satisfied that the proposed development will not generate unacceptable noise, dust or vibration impacts. To some degree, impacts in these areas are mitigated by the extent of the MGIDS area which tends to form a natural buffer around the proposed development.

***c) the best practicable technology for air, water and noise pollution control will be incorporated in the design and operation of the equipment and facilities to be used for the purposes of the industry;***

The Applicant has demonstrated that air, water and noise impacts associated with the proposed development can be appropriately mitigated through operational measures implemented on the site (eg baghouses and scrubbers, bunding and HDPE liners, enclosure of the development).

***d) there will be no significant deterioration of air or water quality as a result of emissions from that equipment or those facilities;***

The Department considers that the air and water quality impacts associated with the proposed development will lie within accepted environmental criteria and will therefore not lead to a significant deterioration in those areas.

***e) the site will not become contaminated within the meaning of Part 5 of the* Environmentally Hazardous Chemicals Act 1985.**

The development site will have a high-density polyethylene liner installed under it to prevent contamination of soil and groundwater. Further, sodium chlorate is known to biodegrade in warm, moist environments. The Department does not consider that significant likelihood of site contamination exists.

A consent authority should not grant consent to any development unless it is satisfied that:

***a) there is adequate provision for setbacks between the development and existing watercourses;***

The closest water course to the proposed development is Tinkers Creek. The Department considers that the sodium chlorate plant is sufficiently set-back from the Creek. The Department of Land and Water Conservation generally concurs with this position.

***b) an adequate vegetation cover is maintained or reinstated so as to minimise soil erosion;***

The proposed development site is currently almost completely devoid of vegetation. To minimise the potential for soil erosion in future, the Applicant is required to landscape and maintain the site with endemic vegetation species.

***c) where necessary, adequate retardation basins, grassed floodways, sedimentation pits and trash collection facilities are established and maintained;***

The Department considers that the sedimentation at the northern end of the site is an appropriate means to control and manage stormwater and site run-off. The sedimentation will minimise the impacts of suspended solids (from erosion) on Tinkers Creek and Lake Liddell.

***d) adequate measures are provided to control soil erosion during construction of the development.***

The Applicant is required to prepare and implement a Construction Environmental Management Plan, including specific measures to address erosion during construction of the proposed development.

**Objectives Relating to Waste**

The objectives of the plan in relation to planning strategies concerning waste disposal are to:

***a) provide for safe and effective disposal of domestic, commercial and industrial wastes, including toxic materials;***

The sodium chlorate plant will generate a waste stream classified as "industrial waste" due to the presence of chromate in that stream. The use of sodium chromate at the proposed development is unavoidable (it is a corrosion inhibitor and a catalyst). The Department is satisfied that the Applicant's proposal to collect the waste for transport and treatment by licensed contractors is an appropriates means to deal with this waste stream.

***b) avoid the entry of harmful chemicals into the environment;***

Through air dispersion modelling, the Applicant has established that the emission of harmful chemicals will not result in an exceedence of relevant environmental criteria. The Department considers that the potential for release of chemicals by other means (site run-off, spills, leaks) is minimal, with appropriate requirements being incorporated into the recommended instrument of consent to address these issues.

***c) encourage the most efficient use of resources by recycling or alternative use as appropriate.***

The Applicant is required to prepare and implement a Waste Management Plan to maximise reuse and recycling measures where appropriate.

## APPENDIX B - CONSIDERATION UNDER SECTION 79C

Section 79C requires that the consent authority, when determining a development application, takes into consideration the following matters.

***(a) The provisions of:***

***(i) any environmental planning instrument;***

In relation to the proposed sodium chlorate plant, the following environmental planning instruments apply.

- *State Environmental Planning Policy No. 34 - Major Employment-Generating Industrial Development*;
- *State Environmental Planning Policy No. 33 - Hazardous and Offensive Development*;
- *State Environmental Planning Policy No. 44 - Koala Habitat Protection*;
- *Hunter Regional Environmental Plan 1989*; and
- *Muswellbrook Local Environmental Plan 1985*.

Consideration of the provisions of these instruments, in the context of the proposed development is outlined in section 3.4 and considered in full in Appendix A of this report.

***(ii) any draft environmental planning instrument that is or has been placed on public exhibition and details of which have been notified to the consent authority;***

There are no draft environmental planning instruments relating to the development.

***(iii) any development control plan;***

There are four development control plans (DCP) that apply to the proposed development:

- DCP No. 1 - Off-Street Parking;
- DCP No. 7 - Developer Contributions - Section 94
- DCP No. 9 - Erosion and Sediment Control Plan

These DCPs have been taken into consideration as part of the Department's assessment of the proposed development. DCP No.1 has been addressed in section 4.4 of this report, DCP No. 7 in section 4.6 and DCP No. 9 in section 4.3.

***(iv) any matters prescribed by the regulations that apply to the land to which the development application relates;***

Clause 92 of the *Environmental Planning and Assessment Regulation 2000* requires the following matters to be taken into consideration by a consent authority in determining an application:

- *The Government Coastal Policy (where relevant);*

  The Government Coastal Policy does not apply to development in the Muswellbrook local government area.

- *In the case of a DA for the demolition of a building, the provisions of Australian Standard AS 2601-1991: The demolition of structures, as in force 1 July 1993;*

  No buildings will be demolished for the proposed development.

***(b) the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality;***

Section 11 considers the environmental impacts of the proposed development in detail. The Department is satisfied that all environmental impacts can be appropriately managed and mitigated through the conditions of the recommended instrument of consent.

***(c) the suitability of the site for the development;***

The MGIDS area has been identified as being appropriate for the location of certain energy-intensive industries, in accordance with *State Environmental Planning Policy No. 67 - Macquarie Generation Industrial Development Strategy*. The first development to which that SEPP applies is the proposed sodium chlorate plant, which has been deemed by the Minister to be a development that may be appropriate for the location in the MGIDS area. The Department's assessment of the subject development application has indicated that the proposed site is suitable for the sodium chlorate plant, given the predicted environmental impacts and proposed mitigating measures.

***(d) any submissions made in accordance with this Act or the regulations;***

A total of 16 submissions were in response to the exhibition of the development application for the proposed sodium chlorate plant. All matters raised in these submissions have been given due consideration, as summarised in section 5.

***(e) the public interest.***

The Department considers that the public, particularly those residents in the Muswellbrook and Singleton local government areas will see the benefits of employment generation and investment associated with the proposed development. The recommended instrument of consent imposes a suite of controls, which the Department considers will mitigate any negative environmental impacts of the proposal so as not to out-weight its benefits. All issues raised by members of the public have been duly considered during the assessment of the proposed dross plant additions.

## APPENDIX C - SUMMARY OF SUBMISSIONS

| Submitter | Date Received | Position (Support/ Oppose) | Issues Raised |
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| Environment Protection Authority | 27 June 2001 | No position stated | • Includes General Terms of Approval.<br>• Indicates that an Environment Protection Licence may be issued for the proposal, subject to the General Terms provided.<br>• Notes that the General Terms of Approval require monitoring of sodium chlorate in dust deposited near the development. The purpose of this General Term is to satisfy the EPA that the development is not exceeding those environmental impacts predicted in the EIS. The EPA requests that any instrument of consent be worded to permit the frequency of or need for this monitoring, should results of the monitoring consistently meet acceptable levels. |
| Department of Land and Water Conservation | 11 July 2001 | No position stated | • Includes General Terms of Approval.<br>• Indicates that a licence under Part 5 of the Water Act (for 4 monitoring piezometers) may be issued, subject to the General Terms provided.<br>• Provides recommendations for the design of stormwater control infrastructure.<br>• Requires an agreement between the Applicant and Macquarie Generation for the supply of water for the proposed development from water allocations under Macquarie Generation's Part 9 licence.<br>• Recommends preparation and implementation of an Erosion and Sediment Control Plan and provides advice on watercourse stability. |
| National Parks and Wildlife Service | 14 June 2001 | No position stated | • Highlights that the NPWS did not have any specific comments in relation to the proposed development. |
| Roads and Traffic Authority | 31 May 2001 | Raises no objection | • Recommends seeking comment from Council in relation to traffic impacts on the local road network. |
| Newcastle Port Corporation | 28 May 2001 | Support | • Highlights that sodium is a class 5.1 dangerous good that must comply with IMDG codes when exported through the |

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| | | | Port.<br>• Indicates that the Port currently handles class 5.1 materials. |
| NSW Fire Brigades | 11 May 2001 | No objection | • Requires a Fire Safety Study for the development to address site access arrangements.<br>• Recommends a strict maintenance schedule for essential services and other safety measures<br>• Notes that the EIS indicates that NSW Fire Brigades will undergo training and familiarisation with the site. |
| Muswellbrook Shire Council | 7 June 2001 | Support | • Provides a suite of recommended conditions of consent |
| Hunter Valley Water Users Association | 30 May 2001 | No position stated | • Recommends that water usage and its sustainability over the life of the development be considered.<br>• Raises concern about the potential destination of contaminated discharges and fire fighting water. Highlights that this water may impact on Lake Liddell and the Hunter River. |
| Country Women's Association of NSW (East Maitland Branch) | 28 May 2001 | Objection | • Quotes findings of a CSIRO report (1996) that indicates a 50% higher incidence of corrosion in the Upper Hunter due to gaseous emissions from power station and the operation of mines in the area. Concerned that sodium chlorate dust may make the situation worse.<br>• Believes that waste from the proposed development will contain toxins such as dioxins, and is concerned about the health impacts of those toxins. |
| Country Women's Association | 22 June 2001<br>) | No position stated (assumed objection) | • Suggests an environmental movement towards total chlorine free bleaching, thereby negating the need for the proposed development<br>• Considers that the proposed development is of socio-economic concern to farms, vineyards, olive groves, horse breeders etc.<br>• Concerned about cumulative air quality impacts.<br>• Believes too little consideration was given to broader traffic impacts, particularly related to the transport of hazardous waste to Newcastle |

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| | | | • Concerned about the toxicity of sodium chlorate on flora and fauna, particularly vulnerable species (barking owl, freckled duck, green and golden bell frog)<br>• Highlights that the health impacts of sodium chlorate and chromium species have not been considered<br>• Concerned about fires and explosions at the proposed development and potential knock-on incidents with the Bayswater Power Station<br>• Concerned about the final destination of wastes from the plant<br>• Highlights greenhouse gas emissions as being of concern, and the impacts of the proposed development on the security of electricity supply in NSW. |
| Private Individual No. 1 | 31 May 2001 | No position stated (assumed objection) | • Concerned about cumulative impacts and questions whether the 1996 CSIRO Corrosivity Survey or the Department's Upper Hunter Cumulative Impact Study and Action Strategy have been taken into account.<br>• Concerned about flow-on effects to flora and fauna, air emissions and water pollution, as combined with impacts of other development in the Upper Hunter.<br>• Suggests that emissions of $SO_x$, $NO_x$ hydrocarbons, CO and dust need to considered.<br>• Concerned about risk of contamination and the acute toxicity of sodium chlorate as a herbicide. |
| Private Individual No. 2 | 1 June 2001 | Objection | • Does not believe that sufficient community consultation was undertaken, and that no community meeting was held.<br>• Concerned about the generation of domestic waste at the proposed development and the burden it will place on the Muswellbrook Waste Management Centre.<br>• Concerned that domestic waste from the proposed development may be contaminated by hazardous materials.<br>• Concerned about potential run-off from the site.<br>• Suggests that the power consumption of the proposed development is high and is concerned that it may have a significant impact on the domestic power grid. |
| Private Individual No. 3 | 31 May 2001 | Objection | • Quotes findings of the CSIRO corrosion report from 1996 and |

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| | | | highlights concern over increased corrosion as a result of the proposed development<br>• Concerned about fall-out of compounds, such as dioxins, that may contaminate collected rainwater<br>• Concerned about air emissions, including gases, particulates and dioxins, particularly under certain weather conditions<br>• Suggests that the Upper Hunter is a major source of dioxins in Australia and that the proposed development may contribute to the issue of dioxins<br>• Concerned about heavy vehicle movements on the New England Highway<br>• Concerned about water cycle management, including water shortages during droughts and wastewater storage.<br>• Concerned about the health effects of sodium chlorate |
| Private Individual No. 4 | 28 May 2001 | Objection | • Believes that the broader strategic goals of the paper industry have not been considered<br>• Does not believe that the principles of ESD have been fully addressed<br>• Considers that alternatives to the proposed development have not been sufficiently detailed<br>• Considers that the Upper Hunter is discriminated against in the context of environmental justice<br>• Believes that community consultation was inadequate<br>• Does not believe that cumulative impacts, as detailed in *Upper Hunter Cumulative Impact Study and Action Strategy*, have been fully considered<br>• Concerned about synergistic air quality impacts<br>• Concerned that cumulative traffic impacts and road use conflicts have not been considered<br>• Believes that greater consideration of rail transport should be provided<br>• Suggests that a full Species Impact Statement should have been prepared for threatened species<br>• Considers that sodium chlorate dust may adversely impact on |

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| | | | flora and fauna, particularly frogs and migratory birds<br>• Notes the inequity of the water consumption attributable to the proposed development<br>• Concerned about water quality impacts on Lake Liddell<br>• Believes clarification of the need for, and the configuration of, a HDPE liner should be provided<br>• Requests clarification of the quality of blowdown water<br>• Disagrees that groundwater in the Upper Hunter is of poor quality<br>• Highlights results of the 1996 study into corrosion in the Upper Hunter conducted by CSIRO<br>• Concerned about dust emissions from the proposed development, particularly in relation to cumulative impacts with current dust levels<br>• Believes that the proposed development will have an unacceptable contribution to greenhouse gas emissions<br>• Questions the accuracy of computer modelling<br>• Questions the accuracy of meteorological data<br>• Concerned about health risks associated with the proposal, including emissions of chromium and chronic health effects<br>• Concerned about the nature of sodium chlorate as a herbicide and defoliant<br>• Raises the issue of sodium chlorate as a dangerous good<br>• Believes that insufficient consideration has been given to the impacts of dichromate-containing materials and their impacts on the environment<br>• Considers that insufficient information has been provided in relation to muds and waste management in general<br>• Believes that hydrogen gas poses a significant risk impact and has not been fully addressed. Requests further details of how the gas is to be handled<br>• Concerned about the potential for fire at the sodium chlorate plant and how it may affect the biophysical and built environments |

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| | | | • Considers that the PHA prepared for the proposal was inadequate<br>• Believes that Environmental Management Plans should be provided |
| Private Individual No. 5 | 1 June 2001 | Objection | • Not convinced that the proposed development will not have a negative impact on air quality<br>• Suggests that court action is pending against the Applicant overseas for health related issues<br>• Concerned about cumulative air quality impacts with electricity generation and coal mining<br>• Quotes an article from the *Singleton Argus* that the Upper Hunter is a "cancer hot spot"<br>• Believes that community consultation was not adequate and insufficient time was provided to review the EIS |
| Private Individual No. 6 | 4 June 2001 | Objection | • Suggests that the Upper Hunter is a "cancer hot spot" and believes that a moratorium should be placed on any developments that may contribute to health impacts<br>• Suggests that total chlorine free bleaching should be encouraged as the use of sodium chlorate/ chlorine dioxide leads to the formation of dioxins<br>• Believes that the community consultation process was not adequate<br>• Concerned about environmental responsibilities should the Applicant meet financial difficulties<br>• Notes that MSDS are not Australian<br>• Believes Species Impact Statements should have been prepared for the Green and Golden Bell Frog and the Barking Owl<br>• Questions whether sufficient water is available to supply the proposed development in the long term<br>• Concerned about water pollution in Tinkers Creek and the Hunter River<br>• Concerned about potential health impacts, particularly under certain meteorological conditions |

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| | | | • Questions the integrity of the HDPE liner proposed to be installed under the development<br>• Suggests that too little information has been provided in relation to the handling, treatment and disposal of mud wastes<br>• Highlights that no details of infrastructure to pipe hydrogen to Macquarie Generation has been provided<br>• Concerned about procedures during an emergency<br>• Concerned about the defoliating properties of sodium chlorate and the proposed development's proximity to vineyards |


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