10. Community and Social Issues

Community consultation has been an integral part of the planning process for the W2CP and has resulted in numerous alterations to the original project design, as discussed previously in Chapter 5. This chapter deals specifically with the potential impacts of the W2CP on the social demographics and community structure.

10.1 Consultation Model

Consultation began at the awarding of the Exploration Licence and has been modified and expanded as the project was developed and environmental, social, technical and financial matters were clarified and defined.

The strategic approach to community consultation adopted by Wyong Areas Coal Joint Venture was pursued with little variation. The strategy is consistent with the principles embodied in community engagement guidelines developed by the NSW Minerals Council.

As the model below demonstrates consultation processes and outcomes have been consistently reviewed and adjusted according to change in community interests, outcomes from exploration and mine planning along with upgrading and changes to local and regional planning instruments.

The model (shown diagrammatically in Figure 10.1) used throughout consultation and communication has been:

- ❒ to establish objectives of our community consultation;
- ❒ to identify our stakeholders;
- ❒ to identify our stakeholder issues;
- ❒ to assess and evaluate our stakeholders issues;
- ❒ to create engagement techniques to address those issues appropriately;
- ❒ to engage with stakeholders and the wider community; and
- ❒ to review consultation effectiveness and adjust appropriately for further engagement.

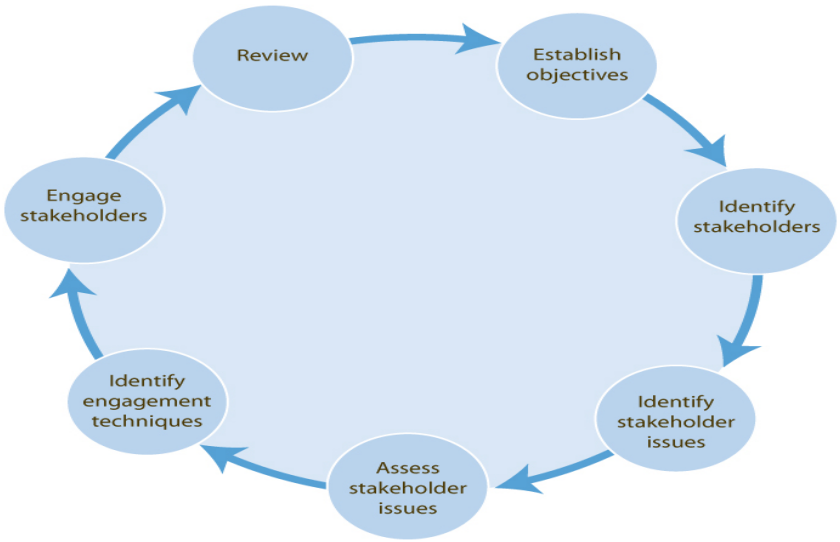


Figure 10.1 Methods of Consultation

10.1.1 Establishing Our Objectives

The objectives of all consultation have been:

- ❒ to establish our credentials;
- ❒ to establish open communication channels with the community;
- ❒ to inform;
- ❒ to listen; and
- ❒ to respond.

These objectives have been used to create the form and structure of the individual, but linked, consultation processes for each of the significant stages. As the model below shows this approach will continue.

10.1.2 Stakeholder List and Assessment

The company began identifying stakeholders prior to winning the exploration licence. Company representatives attended community meetings including those organised by Wyong Council and the then newly established Mine Stop.

These stakeholders (refer to Figure 10.2) and the wider community were invited to a public information evening at Tuggerah Community Hall immediately after the company was awarded the Exploration Licence by the NSW Government.

Soon after the appointment of senior staff to manage the exploration, the company offered and responded to invitations from stakeholders to provide briefings. This has continued. The list of stakeholders has rarely been static and this is understandable when it is recognised that as investigations have unfolded and the mine plan has been developed, some stakeholders no longer have the degree of interest initially expressed. This is most apparent with the announcement that the initial mine plan would be for the western area, and not include the Tuggerah Lake area.

Stakeholders and interest groups consulted to date are listed in Table 10.1.

Table 10.1 Groups Consulted on the W2CP

Community Level	Name
Interest Groups and Organisations	Dooralong Progress Association
	Yarramalong Progress Association
	Catchment Management Authority
	Tuggerah Lakes Estuary Management Committee
	Wyong – Tuggerah Chamber of Commerce
	Executive of Combined Precinct Committees
	Wallarah North Precinct Committee
	Lakes Precinct Committee
	Toukley and District Precinct Committee
	Munmorah Chain Valley Precinct Committee
	Wyong and Tuggerah North Precinct Committee
	The Entrance Precinct Committee
	Watanobbi / Warnavale Precinct Committee

Table 10.1 Groups Consulted on the W2CP

Community Level	Name
	Darkinung Local Aboriginal Land Council
	Guringai Tribal Link Aboriginal Corporation
	Mur-Roo-Ma Inc.
	Water Users (Irrigators) Group (WSP information workshop with DWE)
	Warnervale Progress Association
	Rotary Clubs
	Kariong Somserby Rotary Club
	Toukley Rotary Club
	Ourimbah Rotary Club
	Lake Tuggerah Volunteer Coastal Patrol
	Toukley Probus Club
	Wyong Probus Club
	Wyong Senior Citizens
	Central Coast Geographical Society
	Central Coast Science Secondary Education
	Stop Korean Coal Mining
	Australian Native Orchid Society, Central Coast Branch – Presentation at Ourimbah
	Australian Native Orchid Society, Central Coast Branch – Presentation at Newcastle
	Central Coast Motorsport Club
	Polo-Cross Club
	MotoCross Club
	Community Liaison Committee – Agencies (Mine Subsidence Board; Dept of Primary Industries – now Industry and Investment NSW); Wyong Council (Councillor and staff officer); CFMEU; Association of Mine Related Councils; Dooralong Progress Association; Yarramalong Progress Association, Mine Stop; Australian Coal Alliance; Landowner; Community observers.
Agencies and Local Council	Wyong Shire Council Councillors - numerous briefings/offers for briefings; Councillor represented on project CLC; Council Officers consulted with numerous briefings and meetings, including presentations and site visit with specialist consultants employed by Council.
	DARZL (Development, rezoning and land use committee)
	Department of Planning
	Department of Industry and Investment
	Department of Environment, Climate Change and Water
	Department of Natural Resources
	Department of Water and Energy (now Office of Water)
	Mine Subsidence Board
	Forests NSW
	Roads and Traffic Authority
	RailCorp

Table 10.1 Groups Consulted on the W2CP

Community Level	Name
	Commonwealth Department of Environment Water Heritage and the Arts (DEWHA)
	TransGrid
	Energy Australia
	Gosford-Wyong Joint Water Authority officers and project team (including re Mardi Dam to Mangrove Dam Pipeline project)
	Optus
	Telstra
Industry-related NGOs	NSW Minerals Council
	MESCA (Mining and Energy Services Council of Australia – secretariat by Australian Industry Group)
	Aust Journal of Mining Coal and Minerals Outlook 2009
	Hunter Coal Environment Group (HCEG includes Govt agencies such as DECCW, Hunter-Central Rivers Catchment Management Authority, DPI, Agriculture, State Forests)
Members of Parliament	Paul Crittenden MP
	David Harris MP
	Greg Piper MP
	The Hon Ian McDonald
	The Hon Kristina Keneally
	The Hon Frank Sartor
	Chris Hartcher MP
	Mike Gallacher MLC
Media	(interviews, articles, letters to editors, media tracking, etc) – Media Monitors, Express Advocate, SunWeekly, The Herald, ABC Central Coast radio, 2GO, SEAFM, StarFM, ABC 702 Radio Sydney, Central Coast Business Weekly, International Longwall News
Landowners	Over 300 Landowners

More than 300 landowners have been consulted with throughout the period of exploration and mine planning. This process began with early direct contact with individual landowners as arrangements were set in place for the geological surveys and drilling, and has continued to the current time focussing on those impacted by the mine plan.

Landowners consulted with include neighbours, those above the coal extraction area, those with interests in activities at the proposed surface facilities sites, and potential suppliers. They have included:

Industrial – Direct affected

- Boral Montoro Quarry & tile Manufacturing Plant, Tooheys Road;
- Darkinjung Local Aboriginal Land Council. There have been numerous meetings, especially in 2006/7 with formulation of W2CP proposals. Also liaison with Heritage Officer re archaeological surveys at Tooheys Rd and

elsewhere; latest briefing on land use in April 2009 with DLALC planning agent.

- ❒ Terrace Towers – Precinct 14 WEZ: Various meetings and consultations regarding drilling, ground magnetic survey, drift alignment, water/services and general development co-ordination, noise monitoring.

- ❒ Renters/lessees of Wyong Areas Coal Joint Venture properties

Private Landholders/Property Owners direct survey consultations:

- ❒ Hunter Valley Research Foundation/Central Coast Research Foundation (HVRF/CCRF) surveys – general; regional sampling attitude surveys;

- ❒ HVRF/CCRF surveys – W2CP specific consultations;

- ❒ Martin Associates – SIA surveys, interviews and follow –ups (email, phone, direct doorknock, etc);

- ❒ Flood Study consultation – various stages, from around 2000; as outlined in EA report

Primary/Direct project area

More than 100 landowners were consulted in detail regarding negotiations for standard land access agreements; the access agreement used was the accepted NSW Minerals Council/NSW Farmers Association process.

Additional individual contacts (2005-2009) have included many direct consultations, discussions (on-site, in project office and elsewhere) and correspondence with local landowners. These consultations covered many issues including:

- ❒ land access;
- ❒ groundwater and other environmental monitoring;
- ❒ noise, dust and amenity;
- ❒ subsidence;
- ❒ rivers and water supply;
- ❒ flooding;
- ❒ local employment opportunities (and youth unemployment);
- ❒ economic benefits;
- ❒ job training and apprenticeships;
- ❒ visual and landscape;
- ❒ land use and zoning;
- ❒ biodiversity and conservation;
- ❒ social and economic issues;
- ❒ traffic and transport; and
- ❒ property purchase interest.

Additionally, there have been numerous newsletters (13 to date) directly distributed to landowners plus advertisements and other communications (media, website, open days, CLC, surveys, etc). These consultation efforts, in concert with other activities such as the Wyong Strategic Inquiry process of hearings and submissions, enabled a very thorough understanding of all issues from across the directly affected and wider community.

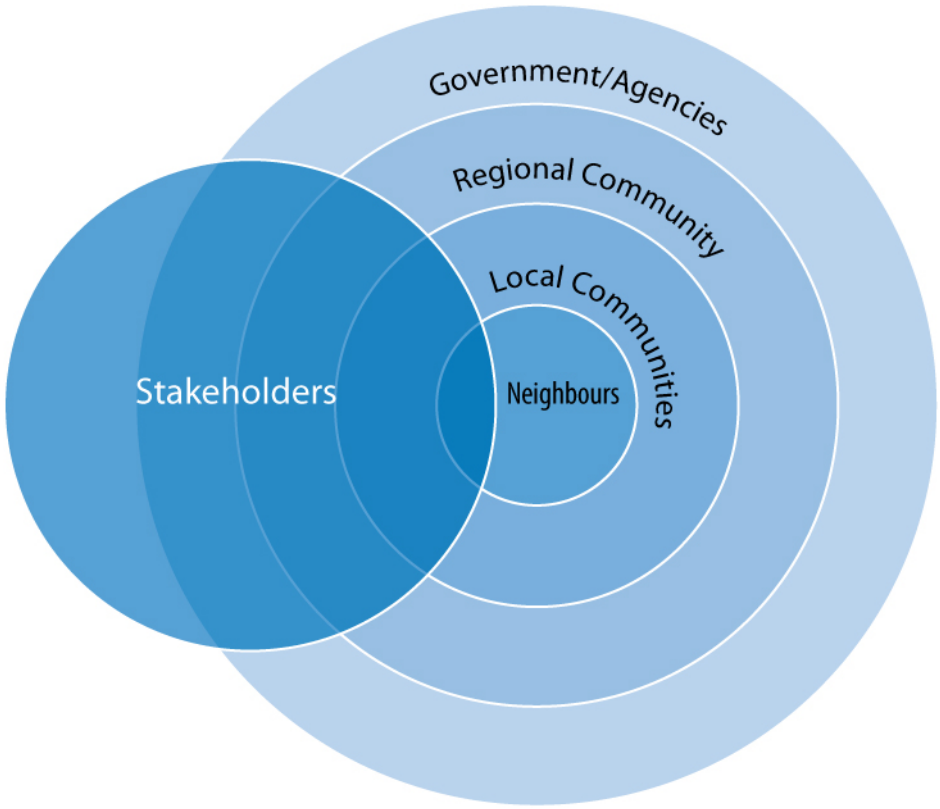


Figure 10.2 W2CP Stakeholders

10.1.3 Identification of Issues

It should be noted that issues identified by stakeholders varied from the exploration process to the mine planning process. Dominant issues identified during the early exploration process were:

- ❒ subsidence of lake foreshore;
- ❒ transport (roads);
- ❒ employment; and
- ❒ subsidence in valleys.

Following announcement by the Joint Venture that initially mine planning would focus on the western zone dominant issues were:

- ❒ subsidence in valleys;
- ❒ surface facility locations; and
- ❒ transport.

It should be noted that the mine planning process was interrupted for a period when Sydney Gas was permitted to explore the coal seams as a gas resource.
Following Sydney Gas work stakeholders involved in the mine exploration and planning stages identified as major issues:

- ❒ impact of water regimes;
- ❒ dust;
- ❒ noise;

- ❒ subsidence; and
- ❒ transport.

It should be noted that community engagement and consultation has been impacted by the establishment of two very active, and dominant, community groups – Mine Stop and Australian Coal Alliance. Mine Stop was later absorbed into the Coal Alliance which had originated as the Australian Gas Alliance during the Sydney Gas exploration period.

Both groups declared from their outset that they were opposed to the mining project thus impacting on the two-way flow of communication between the wider community and the Joint Venture. These two groups (now one) have dominated community representation on the Community Liaison Committee for most of its existence. Both have been closely engaged in the consultation process.

Disappointingly, the position taken by ACA towards the project led to some actions which proved counter-productive to effective communication. This included the preparation and distribution of a document in which the ACA called on the community not to permit access to lands as part of the research and studies in water regimes. As described in other sections, prior to the involvement of the Joint Venture little factual information and data existed about water regimes and flooding impacts in the valleys.

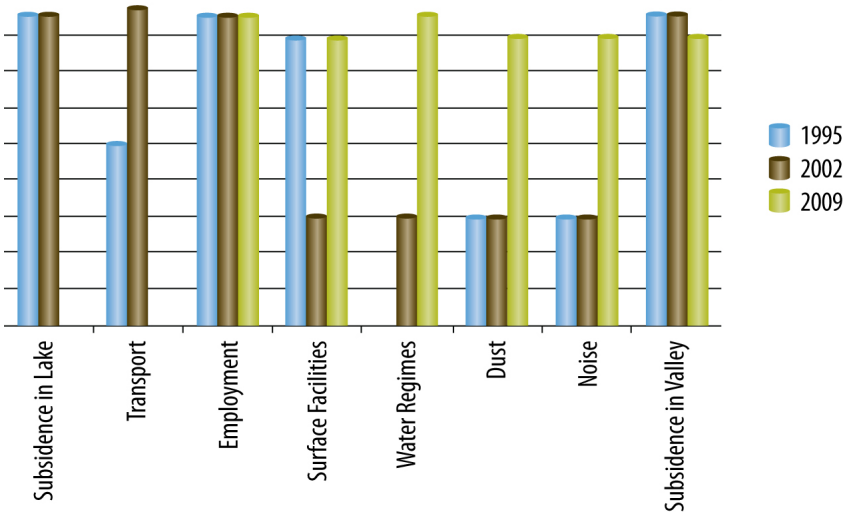
The Community Liaison Committee, appointed by the Minister for Primary Industries has taken a flexible approach to try to enhance two-way communication with the community. Observers from the Australian Coal Alliance were invited to attend regular meetings following that organisation's establishment and declaration of interest in the project.

10.1.4 Changes in Emphasis of Community Issues

In the Central Coast Research Foundation Environmental Attitudes Survey of 2008, it was found that only 13 per cent of respondents ranked potential negative impacts of mining as the top concern. The same survey found that only 9 per cent ranked dust as the top priority.

From 2007 to 2008 the survey found that the number of people in Wyong who agreed that the benefits of coal mining outweighed the negatives increased from 25 per cent to 29 per cent, as shown in Table 10.2.

Table 10.2 Changes in Community Attitude



10.1.5 Engagement Techniques

From the outset the Joint Venture established a communication and community engagement plan to include:

- ❒ Establishment of a Community Liaison Committee appointed by the Minister for Primary Industries;
- ❒ Briefings, including Wyong Council (Councillors, staff, Council community committees including Tuggerah lakes Estuary, Coastal and Flood Management Committee. Local community groups. Wyong Business Chamber (For more than a decade regular briefings were provided but offers of briefings in the past two years have been ignored without explanation), the Joint Venture initiated and has sustained throughout the project a “buy local” policy;
- ❒ Personal visits and meetings (property owners/residents). Some more recent visits and meetings have been inhibited by an ongoing approach by the Australian Coal Alliance to urge residents to reject offers of meetings and briefings;
- ❒ Newsletters, 13 editions have been produced and circulated in the community;
- ❒ Website;
- ❒ Displays;
- ❒ Open Days;
- ❒ Community surveys;
- ❒ Telephone hotlines;
- ❒ Open-door project office;
- ❒ Telephone hotline; and
- ❒ Use of general media (advertising and editorial)

Table 10.3 Summary of Consultation

Timeframe	Information Delivery Mode	Information Collection
1996 - 1998	Project office	Community input with Lake and Land exploration Landowner input
	Community Liaison Committee	Council input
	Landholder meetings	Infrastructure community input
	Media Releases	Community input surveying
	Newsletters	Community input flooding
	Local Government briefings	Community input springs
	NSW Government briefings	
1999 - 2003	Project office	Lake hydrodynamics
	Community Liaison Committee	Presentations on groundwater
	Local Government	Presentations on flora and fauna
	NSW Government	Presentations on mining methods
	Community survey	Social community profiling
	Newsletters	Stakeholder interviews
	Council Precinct Committees	Feedback on monitoring
	Web site	Community survey
	Media releases and interviews	
2004 - 2005	Project on hold while gas exploration undertaken	
2005 - 2009	Project office	Survey input surveying
	Community Liaison Committee	Presentations on mine planning
	Landholder liaison	Stakeholder interviews
	Website	Feedback responses, follow-up
	Media releases / interviews	Media monitoring
	Information telephone line	Stakeholder feedback
	Information advertisements	Community feedback
	Newsletters	Media interest / coverage
	Local Government liaison	Feedback
	NSW Government briefings	
	Community Surveys	Feedback on key issues
	Open Day	Two way communication on issues

During this period the Joint Venture continued to review all external relations and community consultation programs to assess effectiveness prior to the development of on-going programs.

Figure 10.3 Community Consultation

10.1.6 Engagement

Immediately after the awarding of the Exploration Licence by the NSW State government, the Joint Venture implemented a community consultation and communication program that had been developed prior to award. As mentioned earlier members of the community who had already expressed an interest in the project, including Mine Stop, and the wider community were invited to a public information evening at Tuggerah Community Hall.

Senior staff offered and responded to invitations from stakeholders to provide briefings. This has continued. The list of stakeholders has rarely been static and the content of briefings has been adjusted to suit those changes. This was most significant and apparent with the announcement by the company that the initial mine plan would be for the western area.

Also, it should be recognised that three significant events have interrupted the flow of information. They were the period leading up to and following the change of majority shareholding in the Joint Venture, the period during which Sydney Gas undertook extensive drilling investigations in the valleys area and the third was the establishment and processes involved in the Strategic Inquiry into Coal Mining in the Wyong Local Government Area.

A complication in consultation was the misunderstanding of some stakeholders about the purpose and terms of reference of the Strategic Inquiry. As evidenced in the submissions made to the Inquiry by the Australian Coal Alliance some stakeholders argued that the inquiry was premature in that insufficient information

was available about the Wallarah 2 Coal Project. While this project was clearly important in the inquiry it was not the subject of the inquiry. Consequently some stakeholders complained to the Inquiry and elsewhere that the company had failed to consult adequately.

The wider Wyong community has not expressed great interest in the project but the company has maintained its approach of informing all residents as well as those with specific interests. This has been done through use of the wider communication tools including the media and web.

Table 10.4 provides additional detail about various engagements.

Table 10.4 Consultation Details

Activity	Status	Comments
Community Liaison Committee	Ongoing; Meetings as agreed by members.	Originally representative of whole LGA – focus on western area as mine plan evolved. Current membership is: The Hon Milton Morris, chairman, David Lee, General Manager, Sam Lee, Peter Smith, Environment and Community Manager Wallarah 2 Coal Project, Margaret MacDonald-Hill, Mining Related Councils, Julie Maloney, NSW Department of Industry and Investment, Cr Bill Symington, Wyong Shire Council, staff representative Wyong Shire Council, Ian Murray, United Mineworkers Federation, Tom Hole, Mine Subsidence Board, Wilma Colbert, Yarramalong, Michael Campbell, Jilliby, Peter Murray, Jilliby. Observers are Alan Hayes, Australian Coal Alliance, Warwick O'Rourke, Australian Coal Alliance. Minute Secretary, Rae Black. The CLC was placed on hold when majority in WCJV changed and when Sydney Gas became involved in region. Minutes of the CLC meetings and copies of presentations appear on www.wallarah.com.au
Physical presence	Ongoing Wyong Tuggerah	Under the banner of Coal Operations Australia Limited (C.O.A.L.) the company established its first offices and public information area in Wyong commercial centre. Kores Australia has been a shareholder in the Joint Venture since its inception. Move to Tuggerah when opportunity arose to combine both office and core shed. It is worth noting here that throughout the life of the project ownership and majority shareholding changed several times and each was explained through newsletter etc to the wider community.
Newsletters	12 editions and on-going	Early editions focussed on WCJV, licence etc advancing to explanations of explorations processes, early studies including water and flood. As the mine plan began to evolve the focus turned to mining processes.

Table 10.4 Consultation Details

Activity	Status	Comments
Media	Ongoing when required News Advertising Access via website	Media statements generated as significant steps in process are completed. Advertising used to support both media statements and newsletters. Radio interviews initiated and invitations accepted. The project website carries all media statements and advertisements placed since early 2006.
Community surveys	1999 2006	The first was conducted in 1999 by Key Insights Pty Ltd. Results of the survey were first provided to members of the CLC and then to the wider community through media and newsletters. Topics include awareness of mining; awareness of project; acceptance of mining in region. The second was conducted in 2006 by Hunter Valley Research Foundation with similar focus. Independent attitude surveys are conducted annually by the Central Coast Research Foundation. Some findings from those surveys are reported earlier in this section.
Open Day	2006	This open day at Tuggerah was widely publicised. It attracted about 60 people. Visitors were provided with a broad range of information but the focus of the day was to listen to comments. Most interest and comments centred on the protection of the region's water supply. Many of the visitors explained they were members of the Australia Coal Alliance.
Website	Ongoing	A comprehensive website for W2CP was established in 2006 and is a dynamic presence, superseding the former web page developed in 1999. The site contains detailed information and illustrations of indicative mine plans, surface facilities, environmental studies, all newsletters and media statements, and advertisements, the planning process and invitations to contact the company. The website provides useful links to various Government departments, providers of information and the Mine Subsidence Board.
Briefings	Ongoing	Company representatives have presented on more than 50 occasions to local groups including precinct committees, environmental groups, special interest groups and business groups. Specific briefings have been provided to Wyong Shire Council staff and Councillors. Individual letters were sent to each councillor following the 2007 local government elections offering briefings. No responses seeking presentations or briefings were received.

Table 10.4 Consultation Details

Activity	Status	Comments
Personal contact	Ongoing	From the outset, as mine plans began to take shape, representatives of the company established strong relationships with individual landowners. In some cases these were and are owners of land likely to be impacted by a mine but also were owners of properties from which valuable research and investigations could occur. Mostly, these relate to evaluation of water resources. These relationships have faltered somewhat in the aftermath of the very poor relationships between Australian Gas Alliance (the forerunner of Australian Coal Alliance) landowners and Sydney Gas.
Community participation	Ongoing	In initial periods the company provided financial and other support for a number of community activities including shade areas in a local school, financial support for various sporting bodies and financial support for a major youth initiative, the Oasis Centre, a music recording studio. The company was active in the earlier period in Wyong Chamber of Commerce. In 1999 the Wyong Regional Chamber awarded the company its award for Outstanding Large Business Contribution. Repeated attempts have been made to brief the Chamber in recent years and they have been rejected or ignored.
Community Trust		Recently, the company has invited from CLC and the wider community comments on its proposal to establish a community trust as part of its on-going involvement in the community. These invitations have been extended at the Community Liaison Committee, in newsletters, in media and at briefings. The ACA declared that it would not contribute. Community member Mr P Murray and Mining Related Councils representative, Margaret MacDonald-Hill provided valuable models. Both have been invited to join company representatives in an Advisory Group to help establish the framework for the Trust.
Information kits		Information kits have been prepared and are used for specific audiences including land owners in the valleys. Residents of neighbouring suburbs, and media Topics covered in such kits include landowners' rights, updates on progress on the project.

10.1.7 Reviews

Each activity has been reviewed and where needed modified, replaced or added to help ensure consultation is successful. Those reviews have recognised that information provided both proactively and as responses to questions from stakeholders would not always satisfy either the extent of the inquiry or the views held by those stakeholders but in all cases the information provided has been accurate and based on all available knowledge at the time.

10.1.8 Government Consultation

A Planning Focus Meeting was held for the W2CP on 3rd May 2006 and was attended by the Department of Planning (Mining & Extractive Industries, and Sustainable Development Assessments), Department of Natural Resources (now DECCW), Department of Primary Industries - Mineral Resources (now I&I NSW), Department of Environment and Conservation (now DECCW), Mine Subsidence Board, Department of Primary Industries (now I&I NSW), and Wyong Council.

The Planning Focus Meeting is a key part of the approval process and provides an opportunity for key government agencies to have input into the environmental studies at an early stage. Comments received as a result of this meeting were used by the Department of Planning in preparing the requirements of the Director-General. Issues raised by all government authorities who responded to the consultation program are detailed in Section 1.4.2.

10.1.9 W2CP in the Community

Since establishing a presence in the Wyong area the project has been involved with many social, community and sports groups, special interest groups, education facilities and the wider community.

Included in this involvement has been diverse sponsorship arrangements and active participation in community and business organisations.

The project has provided assistance to the community, including:

- Dooralong Bush Fire Brigade;
- Yarramalong Bush Fire Brigade;
- Volunteer Fire Fighters Association;
- Jilliby Public School;
- Wyong Chamber of Commerce;
- Dooralong Public School;
- Wyong High School (Streamwatch);
- Wyong High School (annual excellence awards);
- Combined Churches Carols;
- Chittaway Public School;
- Budgewoi Public School;
- Lakes Grammar School;
- Burnside Homes;
- Salvation Army – Oasis Youth Project, sound recording studio, Wyong;
- Wyong Arts Festival;
- Northern Lakes Family Centre;
- Central Coast Area Health;
- Newcastle and Hunter Youth Development Trust;
- Sports teams and clubs – e.g. Toukley Sailing Club, Central Coast Aboriginal Pelicans, Caves Beach SLSC, etc; and
- Sponsorship of community service announcements (2GO SEAFM).

10.1.10 W2CP in the Region

Throughout the exploration and mine planning periods WCAJV has made considerable effort to understand regional and local planning imperatives and to contribute to the development of new planning policies. This has included:

- "Wyong Strategic Inquiry"; submissions, hearings, submissions in reply, etc;

- ❒ North Wyong Strategic Study (Department of Planning) – liaison with DOP regional office, study consultants, other stakeholders;
- ❒ Warnervale Town Centre SEPP;
- ❒ Wyong Employment Zone SEPP; and
- ❒ Wyee Development Strategy.

10.2 Social Impact Assessment Methodology

A Social Impact Assessment was undertaken by Martin and Associates Pty Ltd, which is contained in Appendix F.

The basic methodology for carrying out the study was to analyse the existing community and social environment and then consider how the local community behaviour and interactions may change with the influence of the proposed mine.

The local impact of mining operations tends to result in relationships with groups within slightly separate communities that have varying expectations. Understanding these differences is an important part of successful community engagement. Listening, understanding and responding to members of these communities is an important component of the social assessment.

Community engagement as part of a social impact assessment is a planned process with the specific aim of working with identified groups of people, whether they are connected by location, interest or affiliation, to understand and address issues affecting them.

Consequently the objectives of the Social Impact Assessment (SIA) are to:

- ❒ characterise the existing community, current behaviour and interactions of residents;
- ❒ characterise and assess perceptions of the proposal by those potentially directly affected;
- ❒ Identify the present use of infrastructure and identify any perceived gaps both physically and from a community perspective;
- ❒ Assess the potential impacts of the Project on the character of the identified communities, on population, accommodation and other social infrastructure on this community;
- ❒ discuss implications for the directly affected community particularly the likely spatial distribution of any in-migrating operational and construction work forces and their impacts on the community;
- ❒ discuss impacts on lifestyles and interaction;
- ❒ assess implications of any other relevant Government policy and guidelines;
- ❒ As considered necessary, prepare a social management and monitoring program to mitigate potential and perceived impacts; and
- ❒ Conclusions and recommendations.

10.3 Definition of the Study Area

Over the past 20 years it has been observed in a wide range of similar projects in Australia and overseas, that the most significant variable affecting the degree of socio-economic impact of a project on a sub-region is the size of any introduced non-local workforce. Consequently, the definition of the study area is of fundamental importance to the following analysis.

The potentially directly affected community is made up of four sub areas within a larger five Census Collection District area. The first area is referred to as the Valleys area mainly those larger original rural-based properties along the south eastern floodplain of the Dooralong valley with some scattered rural subdivisions.

The second area is referred to as the Hue Hue Subdivision area which has large lot residential subdivisions but concentrated on either side of the Hue Hue Road from Jilliby Road to Sparks Road.

The third sub area is on the eastern side of the freeway and includes houses on large lots along Bushells Ridge Road to the northwest of the industrial area and the fourth is the area to the south of the proposed industrial area.

There are three collection districts which are located directly above the proposed underground mining area and two which surround the industrial area located to the immediate east of the Sydney Newcastle freeway. The number of households which are located in the potentially directly affected area was estimated at 1428, made up of 476 households, and the number of persons in the defined 2006 Census Collection District area was 2435, in 811 households (see Figure 10.4).

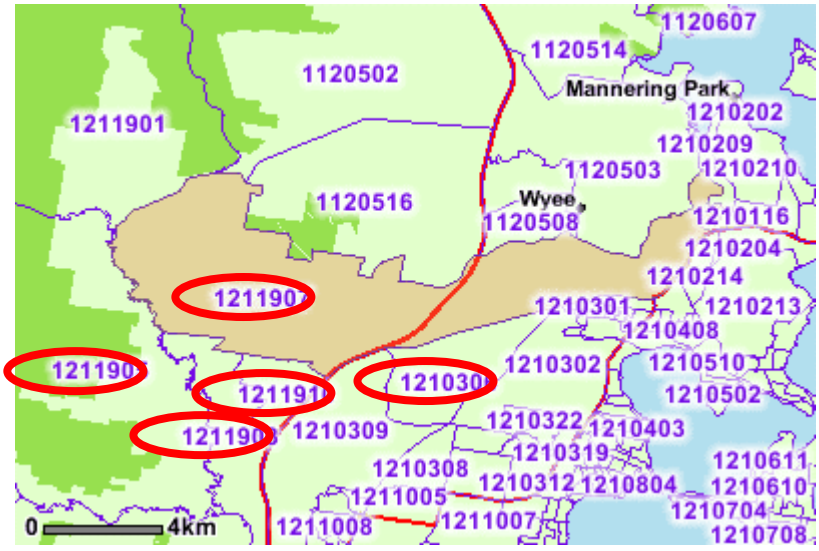


Figure 10.4 The Primary Study Area Collection Districts
Note: - Collection Districts included in the Primary Study Area are circled in Red.
(Source: ABS Census 2006)

A secondary study area was assumed to be the Central Coast area plus the City of Lake Macquarie, since these areas were considered to be within reasonable commuting distance to the W2CP. It is anticipated that the majority of the work force will be drawn from within this area and would be considered to be "local workers". Workers from outside this area would be regarded as "non-local", but this does not necessarily mean that such workers would in-migrate to the area immediately. They may choose to continue a relatively longer commute before they decide as to whether they would relocate to be within the secondary area.

A trip-table (Table 10.5) was developed which shows distance and travelling time to the surrounding population centres. This table was then considered in relation to the ability of the W2CP to attract workers. After research into commuter behaviour of the existing underground mines in neighbouring Lake Macquarie 80 km or 1 hour travelling time was considered to be the regional employment catchment area which includes parts of the Sydney and Newcastle metropolitan areas.

Table 10.5 Trip Time Table from the W2CP to Neighbouring Centres

Mine Site to:	Distance (km) (approx.)	Travel Time (mins (approx.)
Wyong	10	15
Tuggerah	15	10-15
Warnervale	5	5-10
Sydney	100	80
Newcastle	80	45

The towns and associated areas within the secondary study area have been considered for employment potential in this study. The Project is located on the Central Coast which has an economic base mainly comprised of a mix of locally based industries and many commuters to both Sydney and Newcastle. The two Municipalities and one Shire which make up the secondary study area are all economies which traditionally have depended on a high degree of commuting to Sydney, particularly Gosford and Wyong.

10.4 Existing Social Environment

The Central Coast covers an area of approximately 1,854.11 km^2 and is ideally situated just an hour from Sydney and an hour south of the second largest city in New South Wales - Newcastle. Major cities of the Central Coast are Gosford and Wyong.

Once perceived as a holiday destination, the Central Coast is now seen as a location for business and investors seeking to take advantage of the many opportunities the region offers. These opportunities include:

- Exceptional industrial, commercial and residential property options with sound capital growth potential;
- A well developed infrastructure of roads, rail, electricity, gas, water, sewerage and technology advanced telecommunications networks;

- ❒ A large, adaptable and enthusiastic skilled and unskilled workforce;
- ❒ Cost effective access to Australia's major markets and export ports;
- ❒ It is strategically located for warehousing and distribution activities;
- ❒ Extensive employee education and training facilities; and
- ❒ A relaxed, coastal lifestyle unattainable in a city of comparable area.

Wyong Local Government Area
The proposed W2CP, while operating within the Central Coast region, will be specifically located within the Wyong Local Government Area (LGA).

The Wyong LGA covers an area of 827 km2 with 47,400 ha of National Parks and State Forests, which equates to over 35% of the shire designated as a State or National Park.

10.4.1 Population Dynamics

The 2006 population of Wyong Shire was 139,801 (Place of Usual Residence Data) which had grown at an annual average growth rate of 1.73% for the previous ten years, however the growth rate has slowed considerably in the last five years to 1.03% per year. In the broader primary study area, the total population of the community in 2006 was 2,435 or 1.74% of the total Shire population. These figures suggest only a slight increase in the primary study area since the 2001 census with the population growing by 79 people, or approximately 26 households, which translates to about five households per year over the five year inter-censal period.

The population of the potentially directly affected area in 2006 was estimated to be considerably lower at 1,428 or 1.03% of the Shire population.

Population Forecasts
Wyong Shire Council as produced population forecasts broken down by sub area for the period 2002 – 2031. The area which includes the underground mining area is

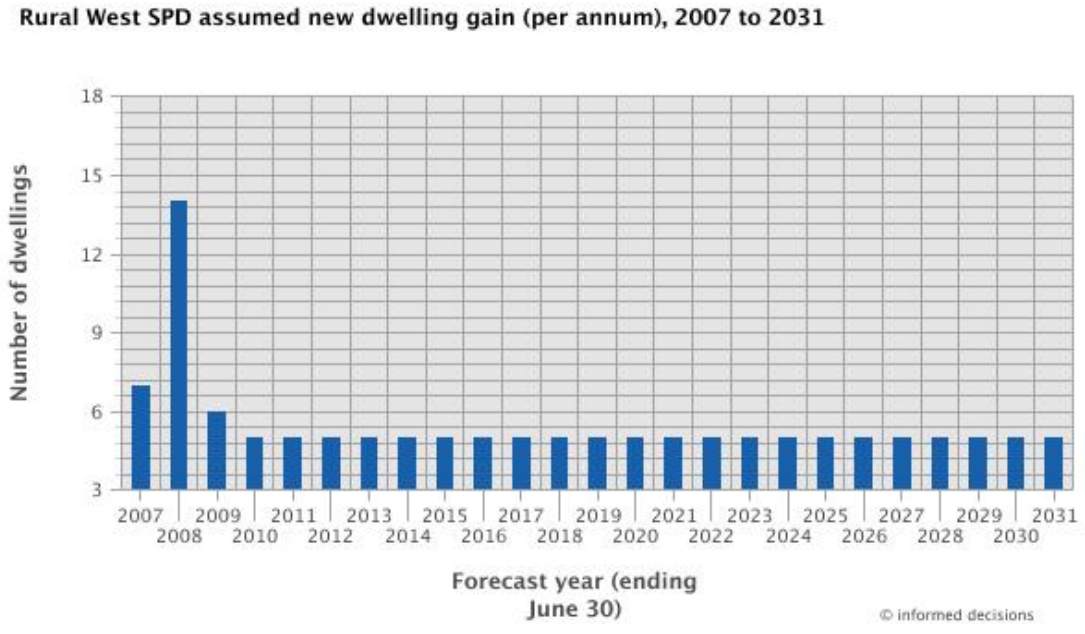


Figure 10.5 Rural West SPD Assumed New Dwelling Gain (pa), 02-31

10.4.2 Workforce

The workforce characteristics of the potentially affected community in 2006 show that mining workers made up 0.8% of the population, which was a higher share than for Wyong Shire, but considerably lower than Lake Macquarie Municipality which has a long history of underground mining. Also interesting was that the construction industry workers made up the third highest share of total employment after the retail and manufacturing industries.

10.4.3 Employment

The NSW Government considers chronic unemployment as a major issue on the Central Coast of NSW. Wyong Shire has experienced a continuing employment problem. The NSW Government also identified the major growth areas within the Central Coast region over the next twenty years as: Warnervale (40,000 additional people), the Peninsula (10,000), The Entrance (6,000) and Gosford City centre (5,000). The remainder of the growth is concentrated across the area in numerous urban centres. Projections estimate that the overall population of the Wyong Shire will be larger than that of Gosford City's after 2014. Warnervale is the closest growth area to the proposed site being located approximately 10 minutes to the south of the proposed industrial area.

Although the Central Coast has been attractive for residential living over the last thirty years, it has not had the same success in attracting businesses. The regional economy depends heavily on the retail and construction industries (with proportionally higher employment than the state average) and has a smaller demand for labour, particularly in highly skilled occupations (in June 2002 the Central Coast's unemployment rate was 7.2%, Gosford City 5.7%, Wyong Shire 9.3%, compared with 6.1% for NSW). This situation is mirrored in the primary study area with the two of the highest share of jobs in construction and retail.

In December of 2006 8.5% of the labour force was unemployed in Wyong, and 5.4% in Gosford. This situation improved gradually over the next two years as the overall economy improved.

Data in Table 10.6 show the latest published small area unemployment rate in December 2008 which shows Wyong Shire at 7% which was still markedly different to Gosford which went down significantly to 3.9% with the NSW figure at 4.8%. Even though the data suggested an improvement, the impact of the global economic crisis is still not included in these figures. It is well documented that the unemployment rate has since once again started to increase. The gap between the need for work and the number of local jobs has been a chronic problem over the last three decades for the Central Coast and the data suggest that Gosford has fared considerably better than Wyong.

An action plan was prepared by the State government in 2003 to address some of the problems of growth and the employment strategy can be summarised as follows:

Desired Outcomes

- ❒ Employment choice and income opportunities;
- ❒ Business opportunities; and
- ❒ Diverse and robust economy.

Strategic Objectives

- ❒ Create local jobs; and

- ❒ Create the economic environment for business growth.

Action Points

- ❒ Reinforce a regional culture that encourages employment-generating development;
- ❒ Provide business support services;
- ❒ Reduce escape expenditure;
- ❒ Encourage local economic development initiatives;
- ❒ Relocate jobs to the region; and
- ❒ Target employment generation in specific industries.

The benefit of having a diversified economy, as does the Central Coast, is that it has the potential to offer a degree of stability when individual sectors are in decline. Despite diversity, current economic activity appears to be weak relative to what has been experienced on the Coast in recent years. The selected indicators show that there is a degree of volatility in the Central Coast economy and this is reflected in an unemployment rate that is appreciably higher than the State average.

A characteristic of the Central Coast economy is that a substantial proportion of its residents travel to neighbouring regions for work. The recently released Central Coast Strategy has identified the creation of local jobs as a regional challenge. The benefit of local employment opportunities will be a reduction of travelling times (and associated costs) for those commuting long distances to work. There will also be a greater likelihood that income earned locally will be spent locally, that is, leakage to neighbouring economies will be reduced.

In the primary study area the pattern of employment in 2006 is considerably better than at the Shire level with a generally high level of employment being enjoyed. The most rural western area had the most total unemployment (7.33%) but it is still lower than the Shire level (8.2%).

Table 10.6 Number of Unemployed and Unemployment Rates: Wyong, Gosford and Lake Macquarie, Cessnock, Sydney, NSW

Location	Total Unemployed Persons							Unemployment Rate							Total Labour Force
	Dec-05	Mar-06	Jun-06	Sep-06	Dec-06	Sep-07	Dec-08	Dec-05	Mar-06	Jun-06	Sep-06	Dec-06	Sep-07	Dec-08	Dec-08
Wyong	4,393	4,794	5,285	5,557	5,609	5,586	4,469	7.3	7.8	8.3	8.4	8.5	8.9	7.0	64,109
Gosford	3,678	4,042	4,452	4,717	4,684	4,201	3,240	4.7	5	5.3	5.5	5.4	5.1	3.9	83,789
L.Macquarie	4,838	4,894	5,022	5,160	5,131	3947	4120	5.2	5.2	5.3	5.4	5.4	4.3	4.2	99155
Cessnock	1,724	1,747	1,767	1,809	1,796	1447	1509	8.0	8.0	8.0	8.2	8.2	6.7	6.6	22934
Sydney	101,600	101,600	103,500	106,400	106,500	103,800	104,900	4.5	4.5	4.6	4.7	4.7	4.6	4.5	2,333,300
New South Wales	178,600	179,400	182,600	186,300	184,400	171,900	170,700	5.2	5.2	5.3	5.4	5.3	4.9	4.8	3,585,300

Source: Dept of Employment and Workplace Relations, Small Area Labour Markets December 2008.

Table 10.7 Employment Status of the Primary Study Area Compared to the Wyong Shire

Status	CD1211905	CD1211903	CD1121910	CD1121907	CD1210306	Wyong Shire
Employed, worked:						
Full-time(a)	53.02%	64.73%	58.79%	59.83%	54.72%	54.97%
Part-time	31.90%	27.80%	35.45%	30.13%	31.45%	30.46%
Employed, away from work(b)	3.88%	4.56%	3.46%	2.62%	5.03%	3.55%
Hours worked not stated	3.88%	1.66%	0.86%	4.80%	4.40%	2.82%
Total	92.67%	98.76%	98.56%	97.38%	95.60%	91.80%
Unemployed, looking for:						
Full-time work	5.60%	0.00%	1.44%	0.00%	4.40%	5.50%
Part-time work	1.72%	1.24%	0.00%	2.62%	0.00%	2.69%
Total	7.33%	1.24%	1.44%	2.62%	4.40%	8.20%
Total labour force	232	241	347	229	159	58,662

Source: ABS Census 2006

The proposed W2CP is consistent with the aim of the Strategy in providing additional employment in the region, as it will generate around 300 new jobs directly, and provide additional employment opportunities for around 750 people through increased expenditure in the local economy and normal flow on effects.

10.4.4 Infrastructure

Residents of the underground mining area predominately use Wyong and Tuggerah, or a combination of both for retail and household services, using Jilliby Road and Hue Hue Road as the travel route. The pattern in the industrial area is slightly different, with more of a spread between Charmhaven, Wyong and Tuggerah.

Education

There is a wide range of education facilities available within the primary area and its immediate surroundings. Jilliby Primary School is the only school located in the underground mining area. There are six primary schools and four secondary schools with reasonable proximity to the primary study area.

Tertiary education facilities is limited to one Technical and Further Education College (TAFE), located at Wyong. Presently there are no courses that cater to the mining industry.

Early Childhood Services

There are a number of early childhood services available in and around Wyong, including Treelands Pre-School and Childrens Centre, Wyong Preschool Kindergarten, Small World Preschool, IE Academy Excellence In Infant Education, as well as Wyong Family Day Care, also in Wyong. Waiting lists for childcare services are typically full. The community baseline survey found childcare was a significant deficiency in community infrastructure particularly in the younger family area around the Hue Hue subdivision.

Table 10.8 Primary and Secondary Schools 2003-2006

School Name	Enrolment
Wyong Public School	394
Wyong Grove Public School	166
Wyong Creek Public	21
Yarramalong Public	19
Jilliby Public	129
St Cecilia's Catholic	391
Primary Total	1120
Wyong High	733
Wyong Christian Community	486
Mackillop Catholic	932
St Peters Catholic	996
Secondary Total	3147

Source: NSW DET and Annual Reports

Health

Health Services are also extensive in the secondary study area and within 10 -15 minutes of the proposed site.

The NSW Government has been redeveloping Gosford and Wyong Hospitals under the Area's Health Access Plan. The progressive development of the new hospital on the Wyong Hospital site will almost double the size of the previous existing facility providing significantly increased capacity for the Shire's population.

Wyong Hospital provides inpatient, outpatient and emergency services for the northern sector of the Central Coast. In 2007, there was a significant enhancement to inpatient services with the opening of the 50-bed Mental Health Centre and an additional 14 beds in the Emergency Department.

The new development at Wyong was said to make the Wyong Hospital into "one of the most modern in NSW and enhance its role as the major acute hospital in the Wyong Shire" (NSW Health Department website).

The new facility was progressively opened from 2004 and the redevelopment of the Wyong Hospital means that it is planned to have a total of 319 beds which provides a high level of service to the Wyong local government area. The facility has three specialist areas and provides 25 Adult Acute beds, 15 Older Persons beds and 10 High-Level observation beds when fully operational.

The hospital is supported by a number community medical centres with Wyong, the facility at the hospital and Warnervale being closest to the proposed site.

***Community* Services**

According to information supplied by the local Shire Council there is reasonably good cooperation between local and State government agencies and community organisations responsible for the provision of community services. These agencies generally work together to find solutions to priority issues affecting the Wyong Shire area. The area is considered to be well catered for, and as some of the development planned has not reached expectations to date, there are typically issues in providing enough capacity to support a growing urban community.

Planning is also ongoing with a Strategic Directions document looking into Human Services and Quality of Life.

There are intended to be Action Plans for Key Social Themes in the Shire. Measurement of the key themes will result from a joint study involving the Councils of Wyong and Gosford and the CSIRO. Community Services were found to be well coordinated between Local and State government Agencies.

Temporary Accommodation
Survey of the temporary accommodation available on the Central Coast for the December quarter of 2008 found that occupancy rates were around 49.6%, well below the NSW average of 58%. Total rooms available per night on the Central Coast in December quarter were reported to be 5458.

10.5 Economic Environment

The Central Coast Research Foundation (CCRF) was commissioned to undertake an economic impact assessment of the proposed W2CP. Their specialist report is contained in full in Appendix I and summarised in the following sections. Where available, updated information is included sourced from ongoing and publicly reported economic and social monitoring work undertaken by Central Coast Research Foundation.

10.5.1 Overview of the Central Coast Economy

The Central Coast economy was historically based on agriculture and tourism but, helped by the development of the Sydney-Newcastle Freeway (F3 Freeway), the breadth of development has been increasing. In terms of value, Manufacturing was the largest economic sector on the Coast in 2001, however there is a diverse mix of industry sectors, many of which reflect the available natural resources.

The natural resources of the Central Coast include mineral deposits and also the coastline and agricultural lands. The coastline and coastal lakes have supported substantial tourist developments, from major resort complexes to owner operated bed and breakfast establishments. Local industries have also developed around agriculture and mining, as have firms in the manufacturing and services sectors.

Population growth on the Central Coast was, amongst other factors, assisted by the development of the F3 Freeway. The local amenity of the area, particularly its coastal setting, attracted many new residents. However, this population growth has been greater than the rate of local employment growth. The Central Coast Regional Strategy 2006 to 2031 indicated that about one-quarter of employed persons who live on the Central Coast commuted outside the region for work, with most travelling to Sydney. The Strategy suggested that the ability of the Central Coast to be self contained, in terms of providing employment opportunities for residents, is likely to be weakened further as population growth outstrips the increase in local jobs. If correct, the proportion of employed persons commuting to employment centres outside the Central Coast is likely to rise.

The proportion of Central Coast residents working in neighbouring regions has both positive and negative consequences. The incomes earned elsewhere are likely to generate additional spending on the Central Coast and, if they do, they will provide an injection into the local economy which will ultimately assist the growth of local jobs. However, this impact will be diminished if the income earned outside the

Coast is spent in the neighbouring regions, for example, in centres which are close to the place of work. The amount of time commuters spend travelling can have negative consequences on work-life balances as well as making this commuter group vulnerable to rising fuel and transport costs. Overall, there is more advantage in having employment opportunities within reasonable travelling times of where people live. For this reason, the creation of local jobs is seen as a regional challenge for the Central Coast.

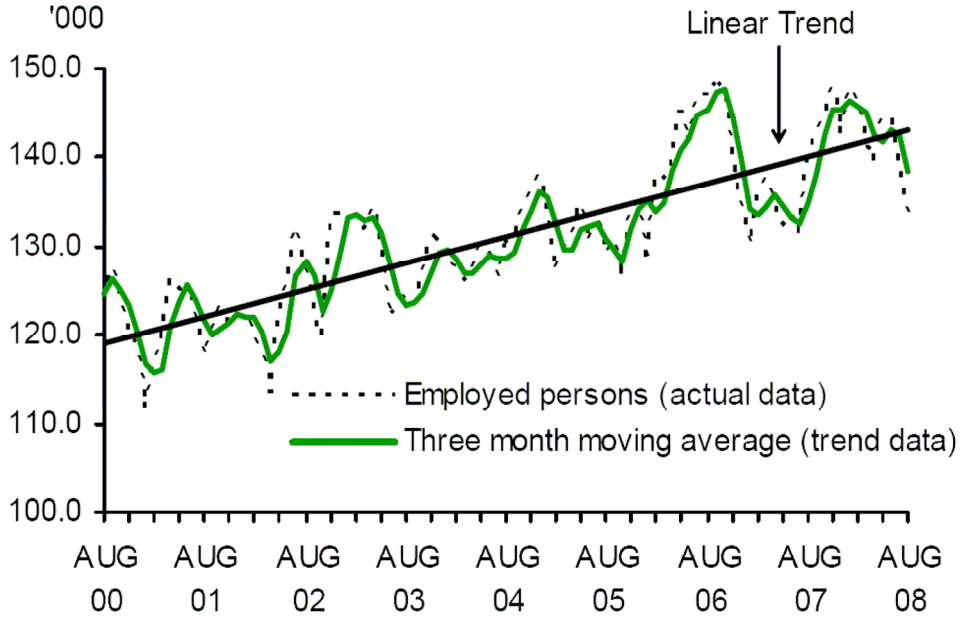
Estimates of gross regional product allow a comparison to be made of the size of sectors within a local economy and have, for 1991 and 2001, been published by National Economics and the Local Government Association. The Central Coast economy has a large *Manufacturing* sector. Over the ten years between 1991 and 2001 the size of this sector increased to represent more than one-fifth of the total economy.

In terms of proportional size, *Construction* and *Retail trade* are also large sectors, despite the proportional fall in the value of the *Construction* sector between 1991 and 2001. Over this ten year period the absolute size of most sectors of the Central Coast economy grew. However, in terms of proportional size several sectors had a smaller representation in the economy in 2001 than they did in 1991. The largest proportional decline was in *Mining*, falling from 9.8 per cent of the economy in 1991 to 4.4 per cent in 2001. However, the Mining sector remained as a more significant proportion of gross regional product in the Central Coast economy than Education, Transport and Storage, Government Administration and Defence, Electricity Gas and Water, Cultural and Recreation Services and other sectors.

In the September 2009 Central Coast Economic Indicators report by Central Coast Research Foundation it was reported that Mining was one of the few sectors to have shown a substantial increase in employment level on the Central Coast in the year from August 2008 to August 2009.

10.5.2 Central Coast Labour Force

Employment indicators are often used to identify economic cycles, particularly when regular time series data for estimated gross regional product are not available. As shown in Figure 10.6, the long-term trend in the number of people in employment has been rising since 2000 and this growth suggests that the local economy has been expanding. The long-term linear trend shown in this figure is one method of determining when employment levels have been *above* or *below* the long-term average – currently employment levels are below the long-term average.



SOURCE: Australian Bureau of Statistics, Monthly Labour Force Survey

Figure 10.6 Number of People Employed, Central Coast

The Central Coast labour force figures are also influenced by employment opportunities in surrounding urban centres such as Sydney and Newcastle. Central Coast residents who commute to these neighbouring areas for work are recorded in the Central Coast employment figures. Therefore, rising employment on its own is not necessarily reflective of the health of the Central Coast economy.

One of the drivers associated of participation rates is the likelihood of finding work. Participation tends to rise when people feel there is a reasonable chance of finding employment. As this likelihood improves, people who would have otherwise not been encouraged to search for work (i.e. not in the labour force) tend to initiate job seeking behaviour.

Financial necessity can also encourage those who would otherwise not be in the workforce to seek employment. The rising cost of living (as measured by the consumer price index), recently high fuel prices and the last round of interest rate increases would have contributed to a greater financial need for many households to have an additional income stream – perhaps partially explaining the increase in the female participation rate.

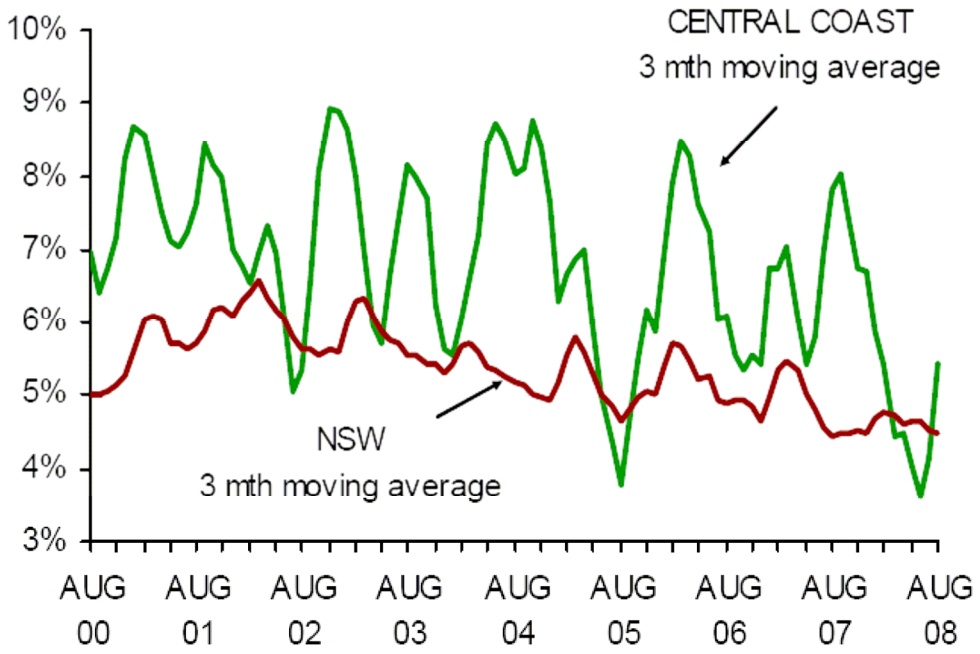
The data for participation rates and employment are both indicative of a positive economic climate for the Central Coast. However, other non-labour force indicators (discussed below) suggest that economic activity is weak relative to earlier years.

Evidence of the susceptibility of the Central Coast to economic cycles is found in unemployment data. As shown in Figure 10.7, the volatility in the Central Coast's unemployment rate suggests changed economic circumstances can have significant consequences for the labour market. Part of this volatility can be explained by the sample data on which the unemployment rates are estimated. Variation in this data

contributes to large swings between months, which are not completely removed by the three month moving average.

However, examination of the time series data shows periods when the average Central Coast unemployment rate has been substantially higher than the State figures. The tendency for these rates to stay above the State figures suggests an inherent volatility in the local labour force.

As shown in Figure 10.7, high unemployment rates have tended to characterise the Central Coast since 2000. In early 2008, the unemployment rate temporarily moved under the NSW rate, but it is now higher the NSW rate and its direction is upward. Current financial and economic conditions suggest that unemployment rates nationally and for the Central Coast will edge upwards.



SOURCE: Australian Bureau of Statistics, Monthly Labour Force Survey

Figure 10.7 Unemployment Rates, Central Coast and NSW

In the September 2009 Central Coast Economic Indicators report by Central Coast Research Foundation it was reported that there has been a three year declining trend, from September 2006 to September 2009, in the number of employed Central Coast residents, particularly in the person-based groupings. Despite the decline in employment numbers, unemployment has been contained by marked falls in the workforce participation during the last two years. In the September 2009 quarter, employment had reduced a further 1.9% and the unemployment rate had risen to 6.8% but which would have been higher except for the effect of reduced participation. Participation had reduced to 56.8% which reflects an ongoing decline that is not reflected in the general NSW economy.

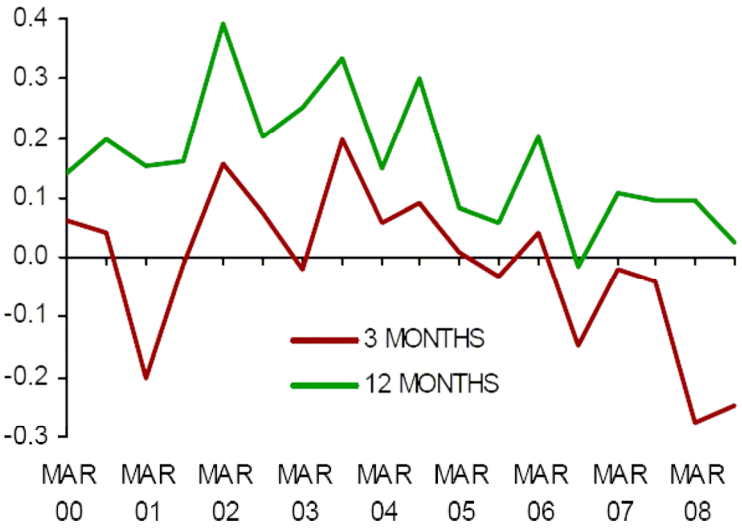
As stated previously, only a few Central Coast economy sectors had shown substantial increases in employment of the year from August 2008 to August 2009, including Mining, Arts and Recreational Services, Transport Postal and

Warehousing, and Electricity Gas Water and Waste Services. More significant employment declines were registered in Construction, Accommodation and Food Services, Retail Trade, Health Care and Social Assistance, and other sectors.

10.5.3 Central Coast Consumption Indicators

Given the relative importance of retail trade and construction to the Central Coast economy, the activity of local consumers can have significant impacts on the direction of economic activity. Two important consumer indicators are: firstly, the level of confidence consumers have in the local economy; and secondly, the level of residential building approvals. The level of consumer confidence is important because it can influence the direction of consumer spending; less confident consumers are more likely to be conservative spenders. Residential building approvals are both an indicator of household consumption (of new housing) and a leading indicator of activity in the construction sector.

Consumer confidence in the local economy has been weakening over recent years (see Figure 10.8). The implication from this movement is that local consumers are likely to be more conservative in their spending behaviour. This trend in consumer confidence corresponds with declining numbers of new housing approvals. International economic conditions and forecasts of deteriorating conditions in Australia over 2009 are likely to further constrain consumer confidence and consumer spending.



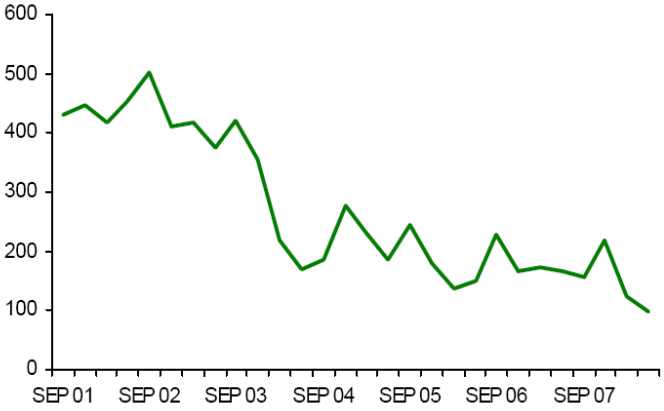
SOURCE: CCRF household surveys

Figure 10.8 Consumer Expectations for the Central Coast Economy

As shown in Figure 10.9 the trend in building approvals has been weakening in recent quarters. This low level of activity is partly attributable to declining residential house prices and increasing interest rates (up to September 2008). The figures suggest Central Coast residents and developers are not initiating plans to build new homes or add to existing dwellings in an environment where equity in existing housing is being eroded and the return on investment in the housing sector is unattractive. The Central Coast median house price is lower than most parts of Sydney, making the Region a more affordable location for residents. However, the

relatively limited opportunity for employment on the Central Coast is a countervailing influence which is limiting demand.

The Central Coast economy is particularly vulnerable to downturns in discretionary consumer spending because retail trade employs the highest proportion of Central Coast residents. Recent initiatives such as family and pensioner payments announced by the Federal Government may revive spending during the Christmas period, but this will at best provide a short-term reprieve from what are longer-term trends on the Central Coast.



SOURCE: Australian Bureau of Statistics, Catalogue Nos 8731.1, 6427.0

Figure 10.9 Number of Residential Building Approvals, Central Coast

10.5.4 Conclusion on the Central Coast Economy

The benefit of having a diversified economy, as does the Central Coast, is that it has the potential to offer a degree of stability when individual sectors are in decline. Despite diversity, current economic activity appears to be weak relative to what has been experienced on the Coast in recent years. The selected indicators discussed in the previous sections show that there is a degree of volatility in the Central Coast economy and this is reflected in an unemployment rate that is generally higher than the State average.

A characteristic of the Central Coast economy is that a substantial proportion of its residents travel to neighbouring regions for work. The recently released Central Coast Strategy has identified the creation of local jobs as a regional challenge. The benefit of local employment opportunities will be a reduction in travelling times (and associated costs) for those commuting long distances to work. There will also be a greater likelihood that income earned locally will be spent locally, that is, leakage to neighbouring economies will be reduced.

10.6 W2CP in a Social and Economic Context

The total economic impact of the production of a final product by an organisation is identified according to its initial impacts and flow-on impacts. These impacts are measured in terms of the value of output generated and the number of jobs created, in total and in each sector of the economy.

There were two stages of the W2CP analysed:

1. **Construction** and preparation work that would ultimately enable the mine to be productive. During the period of construction and preparation, the initial output impacts are measured by the value of revenue secured by the industries involved in this phase of the project. The initial employment impacts represent the number of people employed during construction and preparation.

2. **Operational** stage of the mine. The number of people estimated to be employed directly by the W2CP is the 'initial impact'. The flow-on output and employment impacts will occur as a result of these initial values for expenditure and employment at the mine.

10.6.1 Expenditure

Construction

The economic analysis of the W2CP identified the likely expenditure patterns for the on-site construction that would be required to extract coal from the site. The data also identified the likely pattern of direct employment that would result from the mine's operation.

To develop the site to enable the extraction of coal, the W2CP estimates that on-site construction and preparation work would require initial expenditure of $613.5 million, of which $168 Million in construction, $270 Million in Machinery, $59 Million in Transport equipment, $26 Million in Retail, $20 Million in Property and business services, and remainder in miscellaneous areas.

As a result of these initial expenditures, flow-on impacts will be generated from the production and consumption induced impacts. Over the construction period these combined flow-on impacts are estimated to be $444 million.

As a result of the construction and preparation works required to undertake the contract, the estimated total output impact on the Central Coast economy will be $1,058 million over the three year construction period.

Operation

The measurement of the impacts from operating the Wallarah 2 Coal Mine is based on the planned operational expenditures following construction, and are shown in Table 10.9.

Table 10.9 Estimated Operational Expenditures from the Operation of W2CP

	Expenditures					
	Operation Year 1 $m	**Operation Year 2 $m**	**Operation Year 3 $m**	**Operation Year 4 $m**	**Operation Year 5 $m**	**Average Ongoing $m**
Initial impacts	53.0	74.1	93.9	120.0	121.3	130.8

Over the first 6 years of operation, the expenditures will occur in most sectors of the economy with the largest amounts going to machinery etc., transport and storage, and repairs, as shown in Figure 10.10.

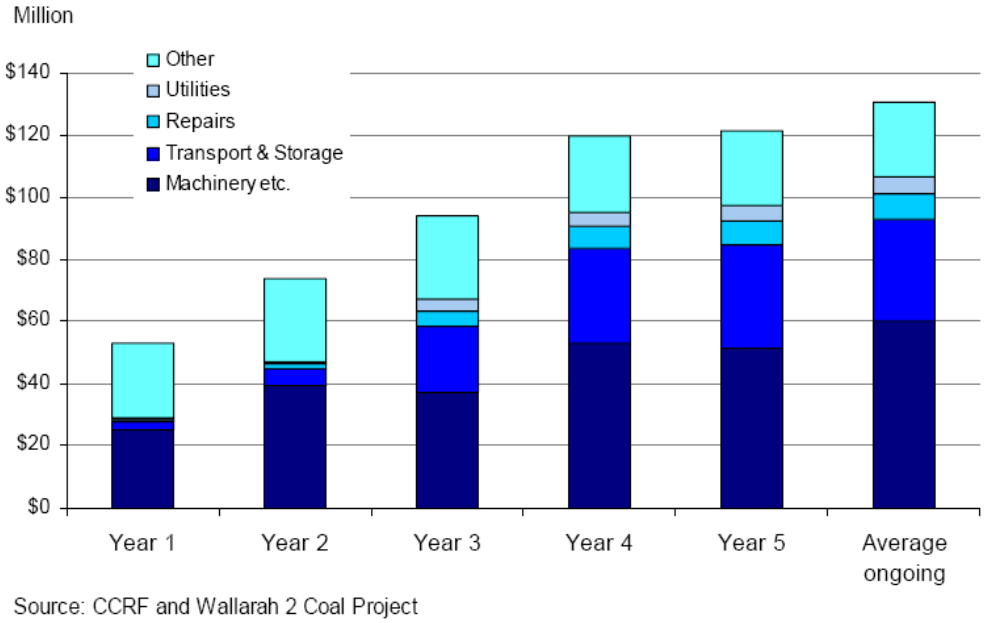


Figure 10.10 Estimated Operational Expenditures (initial impacts) for W2CP

Coal production from the W2CP is expected to start after the three year construction phase. The pattern of production is expected to be 'ramp' shaped with production increasing to 4.5 mtpa and continuing at this level over the life of the mine.

The economic assessment of the W2CP provides estimates of output and employment impacts over the first five years of operation, after which the costs of operating the mine are expected to stabilise. After year five, the estimated operational expenditures and employment from the mine are reported as Average ongoing.

As a result of the operational expenditures made by the W2CP, flow-ons will be generated from the production and consumption induced impacts. The production induced impacts will include the activity that is generated in industries that support mining activities, such as engineering services and transport and the industries that support those industries. The increase in activity will create more jobs and employment will rise. The increase in the number of pay packets in the local economy will stimulate consumer demand and this will, in turn, generate further economic benefits. The flow-on impacts (production and consumption) estimates rise from $53.0 million in the first year of operation to $121.0 million in year five of production. Thereafter, the output impacts are expected to average around $131 million per annum for as long as the mine maintains the assumed level of annual coal output (i.e. 4.5 million tonnes per annum).

As a result of the mine's operations, the estimated total output impact (initial + total flow-on) on the Central Coast economy will rise from $87 million in the first year of production to $198 million in year five. Thereafter, the output impacts are expected to average around $214 million per annum for as long as the mine maintains the

assumed level of annual coal output. Table 10.10 shows the output impacts over this time frame.

Table 10.10 Estimated Output Impacts from the Operation of the W2CP

	Output impacts					
	Operation Year 1 $M	**Operation Year 2 $M**	**Operation Year 3 $M**	**Operation Year 4 $M**	**Operation Year 5 $M**	**Ongoing Average $M**
Initial	53.0	74.1	93.9	120.0	121.3	130.8
Production	15.1	19.5	25.9	32.3	33.0	35.0
Consumption	19.2	27.6	33.0	43.8	44.1	48.4
Total flow-on	34.2	47.1	58.8	76.1	77.1	83.4
TOTAL OUTPUT IMPACT	**87.2**	**121.2**	**152.7**	**196.1**	**198.4**	**214.2**

10.6.2 Employment

Construction

The pattern of initial and flow-on employment estimated to be generated from the construction of the W2CP is shown in Table 10.11. Initially, 2,989 jobs are expected to be created over the 3 years of construction. As a result of this initial employment, flow-on employment impacts will be generated from the production and consumption induced impacts. Over the three years this combined flow-on is estimated to be 2,136 jobs.

As a result of the construction and preparation works required to prepare the mine, the estimated total employment impact on the Central Coast economy over the three years of construction is estimated to be 5,125 jobs.

Table 10.11 Estimated Employment Impacts from the W2CP Construction

	Employment Impacts *			
	Year 1 Jobs	**Year 2 Jobs**	**Year 3 Jobs**	**Total Jobs**
Initial	1,001	1,188	801	2,989
Production	321	278	166	765
Consumption	486	542	342	1,371
Total flow-on	807	820	509	2,136
TOTAL OUTPUT IMPACT	1,808	2,007	1,309	5,125

* Note: Jobs are defined as the equivalent of 1 job-year

Operation
The pattern of expected employment from the W2CP in the Central Coast is shown in Table 10.12. This table also shows the flow-on impacts that are anticipated from these expenditures.

In its first year of operation the mine is expected to generate 250 jobs, which will rise to 300 jobs by the fifth year of operation, (a job is defined as lasting for one year and being full-time).

As a result of the initial employment, flow-on employment will be generated from the production and consumption induced impacts. The flow-on employment will rise from 178 jobs in the first year of operation to 393 jobs in year five. Thereafter, flow-on employment is expected to average around 426 jobs over the remaining life of the mine.

The combined total of initial and flow-on employment is estimated to generate 428 jobs in the first year of operation which will rise to 693 jobs in year five. Thereafter, total of initial and flow-on employment generated because of the Wallarah 2 Coal Project will average around 726 jobs over the remaining life of the mine.

Table 10.12 Employment Impacts during the Operations Phase of the W2CP

	Employment impacts (number of jobs)					
	Operation Year 1	**Operation Year 2**	**Operation Year 3**	**Operation Year 4**	**Operation Year 5**	**Average Ongoing**
Initial	250	300	300	300	300	300
Production	67	87	111	136	138	147
Consumption	111	159	190	253	255	280
Total flow-on	178	247	301	389	393	426
TOTAL JOB IMPACT	428	547	601	689	693	726

Source: CCRF, 2009.

Additional flow-on jobs will be generated in the Hunter Region, amounting to around 366 jobs during full production (refer Section 10.6.5).

10.6.3 Accommodation

Construction

It is estimated that the peak construction workforce will occur in the second year and then steadily decline over the final year. The construction workforce will be made up of several large general contractors which will subsequently tender many subcontractors. The Central Coast has a proportionately higher share of construction industry than for NSW as a whole, and it is therefore not unrealistic to expect that much of the construction workforce may be sourced locally.

Nonetheless, there will be specialised work areas and trades which will require some import of labour into the region. Non local construction workers who do not commute to the site on a daily basis could be accommodated through their sub-contractors at the many hotel, motel and caravan park facilities within the Central

coast area. Potential for impacts on the main tourist season are expected to be limited as the construction schedule will go into recess over the Christmas and New Year period. No construction camp at the industrial area site is presently anticipated due to the high proportion of local workers who can commute to the site on a daily basis and the surplus of accommodation for non-local workers.

Assuming that 50% of the workers were to require accommodation (which is considered to be a worst case scenario) the results of the impact analysis show that there is still adequate capacity within the temporary accommodation sector to satisfy accommodation needs, as shown in Table 10.13. The majority of these workers will be single and/or unaccompanied.

Table 10.13 Demand and Supply of Temporary Accommodation at Construction Peak

Estimated Number of workers needing Accommodation (worst case scenario)	594
Capacity of Central Coast December 2008	5458
Occupancy Rate December 2008	49.6%
Surplus Accommodation in December 2008	2751
% of Surplus required for Project workforce	21%

Source: Tourist Accommodation Statistics, ABS December Quarter 2008.

The main amenity impact on the primary study area will be a significant increase in traffic volumes and any associated noise coming to the proposed surface facilities area. This impact will be mainly confined to the east of the Sydney Newcastle Freeway and the immediate vicinity to the west of the Sparks Road Interchange for workers entering the mine access worker facilities.

Operation

Assuming that all 90 potential employees from the project choose to locate in Wyong Shire, the number of employees choosing to locate in the primary study area was estimated to be 12 households. This figure is based on the 2006 share of employment in the mining industry for the primary study area of 2.4% totalling 6 workers.

However, as the areas in the primary study area currently have high amenity they may prove attractive for relatively higher income mining industry employees. Consequently, the proportional population share was doubled so the total number of households predicted to live in the primary study area was increased to 12 households. This number will double the number of people working in the mining industry in the primary area but is still a relatively small share of total employment. The balance of 78 jobs would be created elsewhere in the secondary study area.

As discussed previously, all flow-on jobs are expected to be taken by local workers. This would mean a total population increase in the primary study area of 36 people. This level of increase is considered to be manageable within the baseline population forecast prepared by Wyong Shire for the rural west sub region.

The balance of the operational workers of 78 workers would be located within the secondary study area with the majority within Wyong Shire. The total population

increase in the Shire would not exceed 234 people (assuming that 100% moved into Wyong Shire). This represents 0.19% of the 2006 Wyong Shire population.

Table 10.14 Projected Impact on Study Area Population and Housing during the Operations Phase

Job Categories	Jobs	Population Increase	Children
Total Direct Jobs	300		
Local Jobs	210	0	0
Non Local Jobs	90	270	90
Within Primary study area	12	36	12
Secondary areas Wyong Shire & Gosford	78	234	78

10.6.4 Impact on Community Infrastructure

Construction

Unless facilities are provided on site, during mealtimes, local cafes and restaurants to the south and west in Warnervale, Wyong and Tuggerah will be affected by a large increase in business for the duration of the project.

Since the majority of the construction workforce will be commuting to the site on a daily basis no significant impacts are anticipated on the various elements of community infrastructure.

There may be slight impacts on the outpatient health services facilities at Wyong hospital and in Wyong and Warnervale due to servicing of the normal needs of the construction workforce on a daily basis.

No significant impacts on local schools are anticipated as the non-local workforce is expected to commute to the site on a daily or weekly basis. If 10% of the construction workforce were to move into the secondary study area particularly Wyong shire, the total demand for schooling and childcare facilities would not exceed 119 students and childcare places at the peak of construction. On a proportional population basis the impact on the primary study area would be less than 15 students and childcare places.

Operations

The majority of the operations workforce will be commuting to the site on a daily basis and the impact on the various elements of community infrastructure is expected to be low.

There may be slight impacts on the health services facilities at Wyong hospital due to servicing of the normal needs of the operational workforce. There may also be some impacts on childcare and local primary schools due to the non- local component of the workforce that will permanently move into the primary study area. However such impacts estimated at 12 children for both schooling and child care is considered to be within the normal planning capacity of the existing school and childcare system. A small increase in the primary schools within the primary study area may also help to keep local schools viable.

The one aspect of community infrastructure that will be more affected by the proposal will be the College of TAFE as a training and apprenticeship program will be needed to improve the skills required to run a modern underground mining operation. Suitable courses are presently available in Newcastle but given the size of the proposed workforce, it would make sense to consider building the program at the Wyong campus. Further liaison and coordination would be required to prepare such a program during the licensing phase of the project.

The results of the community survey revealed that the potential for community interaction with the mining proposal is very limited. The orientation of the community to use Wyong and Tuggerah for the vast majority of community services and active recreation activities was very clearly shown. Passive recreational activities were concentrated to the west of the area in the Watagan State Forest. Underground mining is not anticipated to interfere with these current facilities and there will be no surface facilities or surface traffic generated west of the office facilities located adjacent to Hue Hue Road and north of Sparks Road Interchange.

The main corridors for community movement were found to be Sparks Road to access the Freeway and Hue Hue Road for access south to Wyong township which are well south of the industrial area. The only potential for interaction with the mine industrial area was found to be several respondents who sometimes use the Tooheys Road tunnel under the Freeway to go to the beach. Subject to further detailed design requirements and government requirements, the mine is not expected to interfere with this minor flow.

Impact on Local Businesses

The main longer term amenity impact on the primary study area will be an increase in traffic volumes and associated noise coming to the proposed office, portal facilities and industrial area. This impact will be mainly confined to the immediate area east and west of the Sydney Newcastle Freeway between Sparks Road Interchange and the Doyalson Interchange. These increases will be aligned with the significant traffic increases associated with commuting and visitation to the Wyong Employment Zone (WEZ) and the Warnervale Town Centre (WTC).

Similar to the construction phase, the impact on local business of population coming into the area will be significant on a daily basis and will be concentrated in the area of the office facilities and industrial area. During mealtimes, local cafes and restaurants can anticipate a sustained increase in business for the duration of the mining period. This activity will be focused on Warnervale and Wyong as retail facilities in the primary study area are currently virtually non existent. The estimated increase in the resident population in the primary study area is not expected to exceed 36 based on a rate of 3 people to each new household generated by the mine. These workers will tend to follow the current community behaviour and do the majority of their retail and personal services business in Wyong and Tuggerah using either Sparks Road and/or Hue Hue Road.

10.6.5 Additional Benefits

Royalties

Regardless of their location, most minerals in NSW are owned by the people of NSW, as represented by the Crown. In exchange for the right to extract minerals in NSW, royalties are paid to the Crown by the leaseholder of the mining operation. NSW Legislation identifies the rate and point at which these royalties are charged. Leaseholders determine the royalties owed and submit regular assessments and

payments to the NSW Department of Industry and Investment and these assessments are regularly audited by the Department.

Coal royalties were adjusted by the NSW Government in the 2008 Mini-Budget. These adjustments no longer allowed coal miners to calculate royalties after deducting transport costs. They also changed the coal royalty rates – all of which increased from 1 January 2008, as shown in Table 10.15

Table 10.15 Coal Royalties in NSW

	Up to end of 2008	From 1 January 2009
Open cut mining	7%	8.2%
Underground mining	6%	7.2%
Deep underground mining	5%	6.2%

The expected value of these royalties for the Wallarah 2 Coal Project, based on the royalty rates effective from 1 January 2009 were estimated, as shown in Figure 10.11. They will be payable from the first year of the mine's production and plateau when production reaches 4.5 million tonnes. The royalties will continue at this level while production levels are maintained. The expected revenue for the NSW Government from the operation of the W2CP is expected to start at $1.4 million per annum and reach $20 million per annum by year five. Thereafter, under current policy settings, the royalties are expected to remain at $20 million per annum for the life of the mine. The value of these estimated royalties is shown in Figure 10.11.

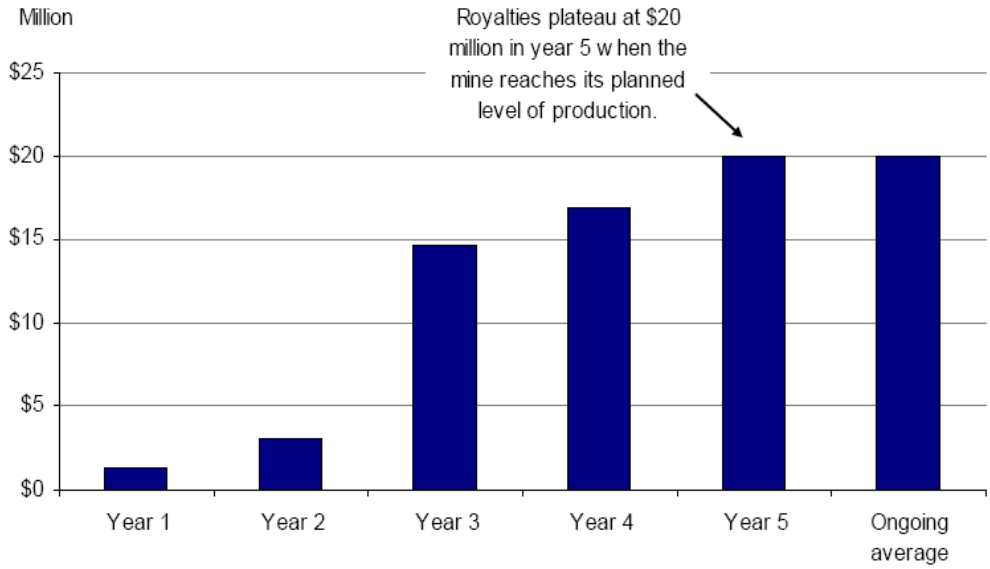


Figure 10.11 Estimated Royalties Payable to the NSW Government for the W2CP

Delivery of utilities to the Tooheys Road site

The location of the W2CP is near the Sydney-Newcastle F3 freeway. While most of the site is on the western side of the Freeway, some site development (Tooheys Road site) is on the eastern side of the Freeway and is zoned as industrial land.

This had been earmarked as future employment lands by the Department of Planning. Currently the provision of services such as roads, water, power and telecommunications to this location is low. The development of this site by the W2CP will include the provision of these and other services. As the W2CP will be underwriting the initial cost of these services, the subsequent provision of these services to firms who locate near the mine will be reduced. This could also provide a financial incentive for industries which support mining operations to locate to the area.

Regional Employment Growth

Some of the economic impacts generated by the operation of the W2CP are expected to spill over into the neighbouring Hunter Region. This spillover will result from the closeness of the proposed mine site to the boundary with the Hunter Region, and the Hunter's historical association with coal mining. Specifically, it is expected that demand for some services available in the Hunter Region, such as specialised engineering, will be created by the operation of the proposed mine. The additional employment benefits which are estimated to accrue to the Hunter Region from the W2CP are shown in Table 10.16.

Table 10.16 Hunter Region Employment Impacts from the W2CP Operation

	Employment Impacts (number of jobs)					
	Operation Year 1	**Operation Year 2**	**Operation Year 3**	**Operation Year 4**	**Operation Year 5**	**Ongoing Average**
Initial	0	0	0	0	0	0
Production	13	37	57	83	85	88
Consumption	89	145	173	239	241	336
Total Flow-on	102	182	230	322	326	336
TOTALJOB IMPACT	102	182	230	322	326	336

10.7 Community Attitude

Central Coast Research Foundation was commissioned to undertake an assessment of community attitude and awareness to the proposed W2CP. The results are provided in the specialist report contained in **Appendix G** and summarised below.

A survey of residents of the potentially directly affected area was conducted in order to better understand baseline community behaviour and interactions. Residents were also given the opportunity to discuss their perceptions about the potential effects of the project. The results of the social survey also included a review of how they presently use physical and community infrastructure.

The survey was sent out to all 476 households who were defined as potentially perceiving that they will be affected by the project.

A telephone survey was prepared by the Central Coast Research Foundation in 2007. Respondents to the sub regional survey were very concerned about potential:

- Impacts on the groundwater supply in the local area (mean concern score of 4.1 out of 5);

- Impacts on the surface water supply in the local area (4.1 out of 5); and

- Mine subsidence impacts to houses and structures (3.7 out of 5).

Consequently, an important issue to address in the potentially directly affected area was to determine how residents presently use water. Inspection of the aerial photography found that many properties were either dependent on house roof tanks or surface dams. Other questions raised included:

- How much groundwater is used by the residents potentially affected by the proposal?

- Which residents were dependent on town water supply?

- How do residents with different occupations perceive the project? And

- What are their most basic fears about the project particularly about subsidence?

10.7.1 CSIRO Research on Quality of Life and Sustainability on the Central Coast

"CSIRO Sustainable Ecosystems" and the Central Coast Councils of Gosford and Wyong developed a partnership to explore quality of life and sustainability on the Central Coast. The rationale for the project is that overall quality of life of a region is thought to be a key driver of population and employment growth. The purpose of this project was to better understand the links between regional sustainability issues and the quality of life of local residents.

Four critical sustainability issues were identified through the interviews (commuting, life long learning, sense of community, and climate change) and these formed the focus for the quality of life workshops (see method section). Participants in the groups were asked if and why that issue was critical for the sustainability of the region and how it impacts on their quality of life. There was general agreement that the issues identified were important for the sustainability of the region. Key points are summarised below.

- Sustainability is about maintaining or improving quality of life for all into the future.

- Critical sustainability issues for the Central Coast region were considered to be commuting, climate change, sense of community and life long learning.

- In the literature the link between sustainability and quality of life is expressed firstly as 'liveability', focused on the present and heavily influenced by the social and the physical areas; and secondly as sustainability, focused on the economic and physical. Discussions from the focus group did not support this temporal separation of sustainability elements. Focus group attendees agreed that what makes up quality of life changes through time, but not that some elements of sustainability should be emphasised over others in order to pursue a path of sustainability.

- Focus group attendees also saw the social elements such as community cohesion and community level problem solving as being critical to sustainability for the region. 'Community' was continually raised in the discussion of all the critical areas for sustainability.

- Focus group members saw the built and natural environment as a significant influence to quality of life on the Central Coast. This emphasis is not highlighted in the general literature and demonstrates the need to understand the local community when determining how to ask questions around the seven life domains.

- If the critical sustainability issues for the areas are not addressed, the general opinions from the focus groups were that quality of life in the region will deteriorate. Specifically, people saw continued social problems with a lack of life long learning, family stress and break down with continued commuting and increased feelings of uncertainty, discomfort and disempowerment in relation to climate change. At the same time, people could envision positive scenarios. Some of the commuters believed that commuting would become less prevalent in the future, and members of both 'sense of community' focus groups believed that sense of community was improving."(CSIRO, 2007).

10.7.2 Central Coast Research Foundation Community Survey

As discussed above "Gosford and Wyong Councils' partnered with the CSIRO to more comprehensively and clearly identify what quality of life "meant" for local residents and to consider the best approach to continue to measure and monitor this. Specifically, the project sought to identify aspects of people's living circumstances that impact on quality of life. The research phase of the project included a literature review; workshop; interviews with Council staff and community focus groups to identify key issues impacting on people's quality of life. As part of the project, a framework for measuring and monitoring quality of life across the region was developed."

Findings from this project included:

- Quality of life is an important aspect of sustainability and an important measure of social progress;

- More wealth does not equal greater well-being;

- Personal attributes and the external living environment affect quality of life;

- People tend to compare their quality of life with people living in other areas (e.g. better than Sydney);

- Quality of life can be measured at both an individual and community level using facts and perceptions (objective and subjective data);

- To measure quality of life you need to overcome the '75% happy response'; and

- Governments can make a difference to quality of life by focusing on the external environment.

The research project made it clear that it was important for Councils to expand data collection methods to include subjective quality of life information.

The CCRF Survey "was undertaken at a time when climate change, the need for alternative energy sources, declining biodiversity and deforestation are regular headlines in the media, Central Coast residents were also asked about whether they were *worried* about some of these 'headline' environmental issues, either from a local or global perspective."

The issues addressed (with the proportion answering *yes* shown in brackets) were:

- *Climate change and extreme temperatures* (69.8%);
- *Clearing of native bushland or forests* (62.6%); and
- *Quality of your drinking water* (68.3%).

The first two issues were put to residents in NSW in 2006, and the results obtained were not significantly different from the distribution of responses to these questions in the Central Coast in 2007. The third issue *air and water quality* was not put to NSW residents. The two sets of results, for NSW and the Central Coast, are shown in Figure 10.12 (CCRF,2008).

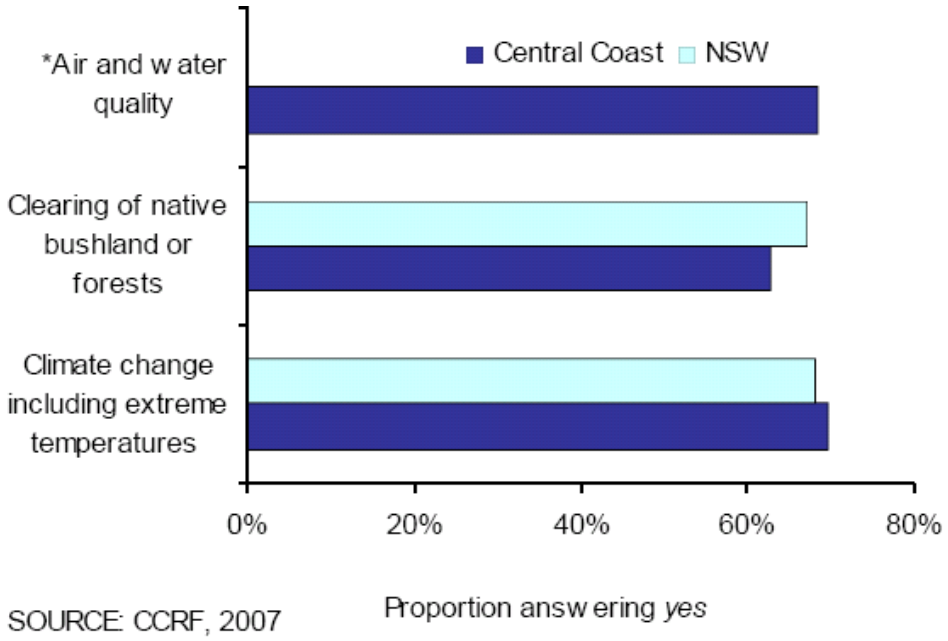


Figure 10.12 Concern about Selected Environmental Issues

There were no significant differences in the responses to these questions, between Gosford and Wyong.

10.7.3 The Strategic Inquiry

The Findings of the Independent Expert Panel stressed the importance of clear and thorough community consultation. The Wyong Areas Coal Joint Venture (WACJV) has developed and implemented adaptive and comprehensive community consultation and stakeholder engagement programs since its establishment in 1995.

The program has involved community surveys, interviews, shopfront offices, open days, website, Community Liaison Committee, direct landowner consultations, and briefings to stakeholders.

Furthermore, the Independent Expert Panel's robust evaluation of coal mining in the Wyong LGA has usefully extended the community engagement process for the W2CP and the independent information available to stakeholders. It has assisted markedly as further information was made available through community consultation as part of the EA process. The findings of the Strategic Inquiry should assist the community to better understand the ready compatibility between well designed and operated modern underground mining and the continued regime for surface streams and alluvial groundwater systems.

10.8 Human Health Risk Assessment

The Health Risk Assessment has been prepared by PAE Holmes, Atkins Acoustics, International Environmental Consultants (Appendix M) and draws upon other specialist studies undertaken for the project. The assessment covers air and noise emissions as well as implications on drinking water. Specifically, the scope of the assessment has included:

- the potential health effects of particles on the human respiratory system;
- the potential health effects of noise from the operation including road and train movements offsite; and
- The potential implications on drinking water quality.

10.8.1 Health Effects of Particles

The human respiratory system has in-built defensive systems that prevent particles larger than approximately 10 microns (μm) from reaching the more sensitive parts of the respiratory system. Respirable particles (PM_{10}) are a health concern because they are easily inhaled and retained in the lung. The epidemiological evidence for the health impacts of particles is based on the mass of particles in the atmosphere with the fine fraction of PM_{10} (i.e. those particles smaller than $PM_{2.5}$) showing a stronger correlation with health impacts than the total mass of PM_{10}. Particles in the range between 2.5 μm and 10 μm ($PM_{10-2.5}$) are referred to as coarse thoracic particles. These particles which are produced primarily from mechanical processes, deposit preferentially in the upper and larger airways. The fine particles are predominantly the products of combustion and these can enter the smaller airways and the alveoli. This is discussed in more detail below.

It is likely that it may be the even finer particles (ultrafine, less than 0.1 μm) which are the main contributor to health impacts and it is also possible that it is the number of particles rather than the mass which is important. At this stage however, the total mass of PM_{10} and $PM_{2.5}$ provides a reasonable surrogate for measuring the "healthiness" or otherwise of the ambient air in urban environments. Furthermore

there are no agreed methods for the routine measurement of ultrafine particles or particle numbers and no ambient goals for these measures of particle pollution. The World Health Organisation (WHO, 2005) notes that while there is considerable toxicological evidence of the potential detrimental effects of ultrafine particles on human health, the epidemiological evidence is insufficient to reach a conclusion on the exposure/response relationship to ultrafine particles. On that basis, no recommendation has been provided by the WHO at this stage as to guidelines for ultrafine particles. There is also no goal or guideline in Australia for exposure to ultrafine particles.

Much of the recent concern for the health effects of fine particles followed from the investigations carried out in the US, with the view to quantifying the health risks associated with both long-term and short-term exposure to airborne particulate matter. The study is colloquially referred to as "The Six Cities Study" from the original work by Dockery et al. (1993), which determined a relationship between fine particulate matter ($PM_{2.5}$) in the air and mortality in six US cities.

The basic findings of the Six Cities Study are that there is an increase in mortality with increasing concentrations of fine particulate matter. The conclusions appear to be robust and have been supported by subsequent studies and as far as can be determined are not confounded by other known variables. It is important to note that the observed association between fine particles and mortality is statistical. The particles are not the primary cause of death, but are one of many environmental and other risk factors. More recently the statistical associations have been revised downwards based on a review of the statistical methods used, but the association remains (HEI, 2003). However the current Australian air quality goals for particulate matter are still based on the more conservative associations.

Particles found in the atmosphere can be from numerous sources and include a very broad range of substances, unlike gases which are usually a specific chemical compound (such as sulfur dioxide, nitrogen dioxide, etc).

Simple measures of particulate concentration do not identify the size distribution, number or source of the particles involved. For example, a single measurement of PM_{10} concentration or load does not reveal whether 90% of the particles are in the 0 to 1 μm size range (fine, submicron particles), or if 90% are in the 2.5 μm to 10 μm range (coarse particles). These issues are important because evidence indicates that differences in particle size and composition are important in the health effects that arise.

Coarse particles come from sources such as windblown dust from the desert or agricultural fields and dust kicked up on unpaved roads by vehicle traffic. Dust from mining and quarrying fall into this category due to the large quantities of geological materials handled by mechanical methods and by vehicular use on unpaved roads.

Fine particles are generally emitted from activities such as industrial and residential combustion and from vehicular exhaust. Fine particles are also formed in the atmosphere when gases such as sulfur dioxide, nitrogen oxides, and volatile organic compounds, emitted by combustion activities, are transformed by chemical reactions in the air (forming secondary particles, which can agglomerate and grow in size).

Approximately 90% of particles released into the atmosphere come from natural sources, such as windblown dust, sea-salt, volcanic emissions, forest fires, pollen and other biological debris. Industrial dusts account for some 3% of all aerosol

particles (equivalent to about half of that contributed by sea salt particles), and only a small fraction of this is related to dust from mining activities.

The air quality goals for particulate matter do not reflect their chemical composition, however it is recognised that not all particles are the same in terms of their health impacts. It is very likely that particles generated from windblown dust and mining activities are intrinsically less toxic than particle emissions from combustion processes which may contain heavy metals and carcinogenic material, including polycyclic aromatic hydrocarbons. Particulate diesel emissions fall into this category and they are discussed in more details below.

10.8.2 Health Effects of Diesel Emissions

In 1999 Cohen and Nikula (1999) published a substantial review of the health effects of diesel exhaust and in 2002 the US EPA completed a major review, including contributions from over 30 authors, of the effects of diesel engine exhaust (US EPA 2002). The information in these two publications is very similar and both have been used to prepare the following summary.

Based on a review of these two publications it can be concluded that the chemical composition of diesel exhaust is reasonably well known and that diesel exhaust contains substances that are known to be harmful to health, both because of the form in which they occur (fine particles as well as gases) and their composition. From a health perspective diesel exhaust (DE) is a complex mixture of gases and PM with the PM having a mass median diameter in the range 0.05 to 1 μm. These particles are capable of reaching the deepest parts of the respiratory system. Exposure to diesel exhaust is usually expressed in terms of exposure to the mass of the particulate phase.

Harmful effects are believed to include an increase in the incidence of cancer and other effects such as the exacerbation of asthma symptoms and irritation and inflammation symptoms. This brief review focuses more on the incidence of cancer as this is far better studied.

Actual human exposures are difficult to determine accurately and dose-response relationships are less well known. Dose response relationships can be determined in a number of ways. Laboratory experiments in which rats, hamsters and other laboratory animals are exposed to various controlled levels of the pollutant provide some insight into heath effects. Deliberate exposure of human populations is generally not done for obvious reasons, but studies of the effects caused by occupational exposures provide valuable information.

For diesel exhaust the most exposed populations are underground mine workers followed by workers in the transport industry such as truck and bus drivers and those that work in places where diesel equipment is widely used. The major difficulty in using such data is in compensating for confounding effects such as smoking and other socio-economic factors that affect health and in making accurate estimates of exposure.

Information from Cohen and Nikula (1999) provides data indicating that the range of concentrations that human populations are exposed to spans three orders of magnitude and ranges from 1 to 10 $\mu g/m^3$ in the general urban environment, 4 $\mu g/m^3$ for truck drivers and up to 1740 $\mu g/m^3$ (over a working shift) for underground mine workers.

The studies cited in the review show a wide range of effects ranging from no significant change in lung cancer rates to significant changes. The study with the largest population was one covering 18,000 British coalminers, controlled for smoking and allowing a latency period of 15 years, indicated that the relative risk for lung cancer was 1.16 per gram-hour of exposure to diesel exhaust (95% confidence interval 0.90 to 1.49). Thus the overall conclusion from the data reviewed is that occupational exposures are likely to cause an increase in the relative risk of cancer. This is consistent with the IARC judgement that classes diesel exhaust as a "probable carcinogen".

The WHO has also reached a similar conclusion, but has added that no data existed that would allow human risk factors to be developed. Other organisations have attempted to assign a quantitative relative risk factor to exposure. The US EPA has used animal studies to estimate that a lifetime exposure to 1 $\mu g/m^3$ would produce 1 excess cancer per 100,000 people. The Californian EPA has used US rail worker data to estimate the risk to be 2 excess cancers per 1,000 people exposed to 1 $\mu g/m^3$ over a lifetime. The most recent US EPA review (US EPA, 2002) concludes that exposure to "5 $\mu g/m^3$ of diesel PM is a chronic exposure level likely to be without an appreciable risk of adverse human health effects". They consider that this is consistent with their annual average standard of 15 $\mu g/m^3$ for $PM_{2.5}$, which of course includes all sources of fine particles, not just particles associated with diesel exhaust.

This level therefore provides some benchmark for assessing the impacts of diesel emissions from mining activities.

10.8.3 Health Risks Associated with Exposure to Silica

Silica (SiO_2) is a naturally occurring mineral composed of silicon and oxygen. It is a component of coal and in the case of the W2CP it is estimated to be approximately 7%. It exists in crystalline and amorphous forms depending on the structural arrangement of the oxygen and silicon atoms. Only the crystalline forms are known to be fibrogenic[1] and only the respirable particles (those which are capable of reaching the gas exchange region of the lungs) are considered in determining health effects of crystalline silica.

There are a number of size-based descriptors used in describing particulate matter, particularly with respect to occupational exposure, and it is useful to define these for the following discussion. The descriptors are:

- PM_{10} - particles with an equivalent aerodynamic diameter of less than approximately 10μm (as discussed above) – the largest of these are inhalable;
- PM_7 - particles with an equivalent aerodynamic diameter of less than approximately 7μm – the largest of these can reach the thoracic region of the respiratory system;
- PM_4 - particles with an equivalent aerodynamic diameter of less than approximately 4μm – the largest of these can reach the alveoli; and

[1] Fibrogenic dust is a dust which causes increase of fibrotic (scar) tissue after deposition in the gas exchange region of the lung.

- $PM_{2.5}$ - particles with an equivalent aerodynamic diameter of less than approximately 2.5μm (as discussed above) – fine particle fraction.

Particles described as PM_7 are a sub-component of PM_{10}, PM_4 particles are a sub-component of PM_7 and PM_{10}, and $PM_{2.5}$ particles are a sub-component of PM_4, PM_7 and PM_{10}.

The three most common types of crystalline silica are quartz, tridymite and cristobalite. Human exposure to crystalline silica occurs most often during occupational activities that involve the working of materials containing crystalline silica products (e.g. masonry, concrete, sandstone) or use or manufacture of crystalline silica-containing products. Activities that involve cutting, grinding or breaking of these materials can result in the liberation of particles in PM_{10}, PM_7, PM_4 and $PM_{2.5}$ size ranges. Ambient crystalline silica dust can occur due to natural, industrial and agricultural activities.

Repeated and prolonged exposure to relatively high concentrations of crystalline silica can cause the disease known as silicosis. This respiratory disease is characterised by scarring and hardening of the lung tissue and it reduces the ability of the lungs to extract oxygen from the air. Occurrences of silicosis are highly correlated to occupations where particles of crystalline silica are released to the atmosphere (e.g. mining, quarrying, foundries, sandblasting). Silicosis is becoming less common in industrialised nations due to the stringent controls on airborne dust and the use of protective devices.

General community (non-occupational) exposure to respirable crystalline silica is typically well below the national exposure standards and consequently is unlikely to present significant risks to public health. The World Health Organization's Concise International Chemical Assessment Document on Crystalline Silica, Quartz (CICAD, 2000) states that "*there are no known adverse health effects associated with the non-occupational exposure to quartz*".

10.9 Assessment Criteria

Occupational Goals

In Australia, the occupational exposure standards for respirable crystalline silica are defined by the National Occupational Health and Safety Commission (NOHSC). The national exposure standard for respirable crystalline silica is 100μg/m^3 (Time Weighted Average (TWA)). Although the occupational standard is not applicable to the assessment of the ambient air quality, the risk of silicosis among people living in areas surrounding activities such as quarrying would generally be very small provided the concentration of respirable particles at the source was acceptable in terms of occupational safety.

Ambient Goals

NSW has not set any impact assessment criteria for crystalline silica. The Victorian EPA has adopted an ambient assessment criterion for mining and extractive industries of 3μg/m^3 (annual average as $PM_{2.5}$) (VEPA, 2007). This has been derived from the Reference Exposure Level (REL) set by the California EPA Office of Environmental Health Hazard Assessment of 3μg/m^3 (annual average as PM_4) (OEHHA, 2005).

US EPA Silicosis Potency Estimates

The US EPA (1996) examined the non-cancer epidemiological literature on crystalline silica induced diseases. From the extensive data available, which examined the medical histories of thousands of miners, they concluded that the cumulative risk of developing silicosis is zero for cumulative exposures of less than 1000μg/m^3.years.

Cumulative exposure is the average respirable crystalline silica concentration a person is exposed to over a period of time, multiplied by the number of years exposed. For example, an exposure of 1000μg/m^3.years, would be experienced by an individual exposed to 14.3 μg/m^3 per year for 70 years. For cumulative exposures less than 1000μg/m^3.years, the US EPA concludes that the risk of developing silicosis is zero.

The methodology defined by the US EPA has been applied to the predicted impacts at the nearby residences to determine the cumulative risk

10.9.1 Health Risks Due To Particulate Exposure From The Project

Exposure to $PM_{2.5}$

The data analysis summarised above in relation to particulate matter was based predominantly on studies in urban environments, where, as discussed above, combustion sources make a significant contribution to total particulate concentrations. The chemical composition of particulates in urban environments is therefore substantially different from the particulates associated with mining. Further, 40 to 60% of ambient PM_{10} levels in an urban environment are typically $PM_{2.5}$, whereas on average the $PM_{2.5}$ fraction of the PM_{10} emitted from mining operations is typically about 12%.

It is reasonable to assume therefore that applying the risk factors developed for urban environments to emissions which are a mixture of crustal origin and coal dust with some contribution from diesel vehicles provides a conservative estimate of the risk associated with exposure to particulates from the Project.

A more realistic, but still conservative approach, given the difference in chemical composition, is to estimate the risk associated with exposure to $PM_{2.5}$ emissions from the Project.

Table 10.17 presents the predicted maximum 24-hour and annual average PM_{10} and $PM_{2.5}$ concentrations at sensitive receptors potentially arising from the Project operations. The 24-hour predictions corresponded to the busiest day.

Table 10.17 Predicted maximum 24-hour and annual average PM_{10} and $PM_{2.5}$ concentrations due to the Project alone at selected sensitive receptors for the Project operations

	24-hour maximum PM_{10} ($\mu g/m^3$)	24-hour maximum $PM_{2.5}$ ($\mu g/m^3$)	Annual average PM_{10} ($\mu g/m^3$)	Annual average $PM_{2.5}$ ($\mu g/m^3$)
Receptor				
P1	8.0	1.3	0.2	0.04
P2	10.9	1.8	0.3	0.05
P3	28.7	4.3	0.6	0.09
P4	15.7	2.6	0.3	0.04
P5	7.4	1.1	0.2	0.02
P6	6.9	1.1	0.3	0.04
P7	14.7	2.1	0.5	0.07
P8	12.6	1.9	0.7	0.09
P9	17.2	2.7	0.7	0.11
P10	10.1	1.6	0.5	0.07
R1	4.2	0.7	0.1	0.01
R2	4.4	0.7	0.1	0.01
R3	3.3	0.6	0.1	0.01
R4	3.1	0.5	0.1	0.01
R5 (Blue Haven)	8.6	1.7	0.3	0.04

The risk factors in Table 2 and Table 3 of Appendix M have been used to estimate the risks associated with exposure to the particulate emissions from the mine. Daily and annual mortality rates for the Northern Sydney and Central Coast region for 2002 to 2006 and daily hospital admissions for all of NSW in 2004-2005 were obtained from the NSW Health website (http://www.health.nsw.gov.au/publichealth/chorep/Accessed (November/2009)). An example of the calculation is shown below.

For a population size of 1000 exposed to a 24-hour $PM_{2.5}$ concentration of 4 $\mu g/m^3$ where the daily mortality is 1.9/100,000 people and the additional risk of death is 0.9% per 10 $\mu g/m^3$ increase in $PM_{2.5}$, the number of additional deaths would be:

Additional deaths per day =0.9/100 x 3/10 x 1.9/100,000 x 1000
=0.0000513

10.9.2 Summary of Dust Related Health Risks

The impacts of the proposed mine project have been assessed in terms of the likely risks to various health outcomes. The risk factors used in the analysis have been developed using research results from the last decade on the health effects of particulate matter on human populations in urban areas. Risks of exposure to silica have also been considered.

The analysis provides estimates of the increase in daily mortality due to emissions from the mine at the most affected receptor on the worst day. In addition estimates are provided on the increase in daily hospital admissions that could be expected

from the most exposed individual due to emissions from the project on the worst day.

The increase in risk of daily mortality on the worst day in the life of the mine is estimated to be 1 in 16.3 million. This is a small risk. Increase in risk for hospital admission is also low.

The health risk from exposure to silica is also extremely low.

10.10 Health Risks Associated with Exposure to Noise

It is recognised (SPCC Noise Control Seminar Notes) that no evidence is available to support or identify any physical disease or any physical illness with respect to noise exposure except from noise-induced hearing loss. However, noise may have some effects which are quite distinct from the potentially damaging effects on hearing. These effects are annoyance, interference with sleep and interference with concentration and efficiency. The reaction of individuals to noise is extremely variable, and highly influenced by the environment in which they occur. The NSW, DECCW published guidelines and policies have been developed for assessing environmental noise from industrial activities and transport infrastructure

It is recognised that construction projects by nature are temporary and not amenable to purpose-built noise control measures applied to industrial processes. For major construction projects undertaken in New South Wales the DECCW recommends procedures for assessing noise and vibration impacts. Publications released and referred to by the DECCW with reference to the assessment of construction noise and vibration impacts include the Interim Construction Noise Guideline (2009) and Assessing Vibration: a technical guideline. The Interim Construction Noise Guideline (ICNG) was developed in response to concerns raised with respect to managing construction noise impacts.

Although not linked to increased mortality rates, exposure to both environmental or occupational noise can lead to deterioration of hearing, sleep disturbance, annoyance and disturbance to communication. These aspects of noise fall generally into two categories:

- environmental noise which covers exposure to sources including industrial. commercial, retail, domestic activities, aircraft, road and rail traffic; and
- occupational noise which covers exposure within the workplace.

For the purposes of assessing the health implications of the W2CP, only environmental noise has been investigated. Occupational noise exposure will be dealt with under the normal requirements of WorkCover when the mine is operational and dose noise exposure levels are determined.

10.10.1 Noise Criteria

The NSW, DECCW published guidelines and policies for assessing environmental noise impacts from industrial activities and transport infrastructure. The procedures were prepared to promote uniform methods for assessing impacts and are documented in the Industrial Noise Policy (INP), Environmental Noise Control Manual (ENCM), Environmental Criteria for Road Traffic Noise (ECRTN); and Interim Construction Noise Guideline.

Operational noise goals for industrial development are published in the INP. The procedures were developed for the purpose of:

- ❒ controlling intrusive noise; and
- ❒ maintaining noise level amenity.

The intrusiveness of a noise source is considered to be acceptable if the L_{Aeq}, 15 minute noise level from the source does not exceed the RBL by more than 5 dB(A). In order to determine amenity noise goals, the source L_{Aeq} levels should not normally exceed recommended acceptable noise levels. Where existing L_{Aeq} levels from industrial sources approach or exceed acceptable levels, design goals are normally set below the existing L_{Aeq} level to limit any further increase or "creep" in the ambient noise levels.

Other factors considered for establishing assessment goals include the existing ambient noise levels, land zoning as defined in the INP, recommended noise planning levels and operating hours.

The DECCW recognise (INP. Section 1.4.1) that in setting assessment goals, the levels established in accordance with the INP assessment procedures are best regarded as planning tools. The levels determined in accordance with the recommended procedures are not mandatory, and an application for a noise producing development is not determined purely on the basis of compliance or otherwise of noise goals. Other factors that need to be taken into account in the determination include economic consequences, other environmental effects and the social worth of the proposal.

In accordance with *INP* guidelines, operational noise is assessed at the most affected point on or within the residential property boundary or if this is more than 30m from the residence, at the most affected point within 30m of the residence (INP).

Project specific goals have been developed for residential receptors in the vicinity of the project. In general, these have been set at background plus 5 dB(A) and modelling has indicated that the project will generally comply with these goals. Where noise exceedances are predicted potential noise mitigation strategies will be discussed with the property owners including purchased and executed if:

- ❒ the owner believes he or she is adversely affected by noise from the proposal; and
- ❒ noise level measurements confirm the recommended goals are exceeded.

In addition to normal operating noise goals, the ENCM provides procedures and guidelines for assessing sleep disturbance from short-term noise events. Referenced to the ENCM (Section 19.3) the $L_{A1,\ 1min}$ noise level measured over a one (1) minute period outside a residential bedroom window should not exceed the repeated L_{A90} background level by more than 15 dB(A). The DECCW accept that the $L_{A1,\ 1min}$ above the RBL is appropriate for assessing sleep disturbance during night-time hours (2200-0700). The modelling and assessment for the W2CP shows that the sleep disturbance criteria will be satisfied at all locations.

Table 10.18 INP Planning Assessment Goals dB(A) re: $20x10^{-6}$ Pa

Type of Receiver	Indicative Noise Amenity Area	Time of Day	Recommended L_{Aeq} Noise Level dB(A)	
			Acceptable	Recommended Maximum
Residence	Rural	Day	50	55
		Evening	45	50
		Night	40	45
	Suburban	Day	55	60
		Evening	45	50
		Night	40	45
	Urban	Day	60	65
		Evening	50	55
		Night	45	50
Passive Recreation Areas	All	When in use	50	55
Active Recreation Areas	All	When in use	55	60
Commercial	All	When in use	65	70
Industrial	All	When in use	70	75

Rural means an area with an acoustical environment that is dominated by natural sounds, having little or no road traffic.

Suburban an area that has local traffic with characteristically intermittent traffic flows or with some limited commerce or industry. These areas may be located in either a rural, rural-residential or residential zone, as defined on an LEP or other planning instrument.

Urban *an area with an acoustic environment that is dominated by "urban hum" or through traffic with characteristically heavy and continuous traffic flows during peak flows. These areas may be located in either a rural, rural-residential or residential zone, as defined on an LEP or other planning instrument.*

Road traffic noise from new land use developments is normally assessed against procedures documented in the ECRTN. The following presents a summary of the ECRTN noise assessment goals.

Table 10.19 Summary of Traffic Noise Assessment Goals

Land Use	Traffic Noise Criteria		Where Criteria is already Exceeded
Development	Daytime (7.00am to 10.00pm)	Nighttime (10.00pm to 7.00am)	
Land use developments with potential to create additional traffic on collector roads	$L_{Aeq,\ 1\ hour}$ 60	$L_{Aeq,\ 1\ hour}$ 55	Where existing traffic noise levels exceed the noise criteria, traffic associated with the proposed development should not increase existing traffic noise levels by more than 2dB(A) Where feasible and reasonable noise levels from existing roads should be reduced to meet the noise criteria. In many instances this may be achievable only through long-term strategies.

The World Health Organisation (WHO) has also developed general community noise criteria to assess the potential for health impacts caused by noise. These generalised criteria are provided in the following table.

Table 10.20 World Health Organisation Community Noise Criteria

Environment	Critical Health Effect	Sound level dB(A)*	Time hours
Outdoor living areas	Annoyance	50 - 55	16
Indoor dwellings	Speech intelligibility	35	16
Bedrooms	Sleep disturbance	30	8
School classrooms	Disturbance of communication	35	During class
Industrial, commercial and traffic areas	Hearing impairment	70	24
Music through earphones	Hearing impairment	85	1
Ceremonies and entertainment	Hearing impairment	100	4

*The ear has different sensitivities to different frequencies, being least sensitive to extremely high and extremely low frequencies.

This assessment although demonstrates compliance with NSW assessment criteria is actually well below those of international studies by the WHO. On this basis the project is not considered to pose an increase health risk on the local community or those communities affected by road or rail noise.

10.10.2 Noise Emissions from W2CP

Noise modelling for the Tooheys Road site shows that the INP noise goals are marginally exceeded at two (2) reference locations during adverse weather conditions. Operational noise from the Tooheys Road site at Blue Haven is predicted to be less than 35dBA even under adverse westerly wind and temperature inversion (worst case) conditions.

Noise modelling for the Buttonderry site shows that the INP noise goals are satisfied.

The predicted LAeq 1 hour traffic noise levels at thirty (30) metres satisfy the daytime 60dBA and nighttime 55dBA target noise assessment goals for collector roads. Passby LAmax noise levels from cars at thirty (30) metres are predicted to be in the order 64-65dBA.

Modelling for the projected future train movements shows that the controlling nighttime noise criteria of $L_{Aeq\ 9\ hours}$ 60dBA and L_{Amax} 85dBA are satisfied at a distance of 65-70 metres from the near-side rail tracks. With respect to the existing train noise the L_{Amax} level from passing freight trains is the controlling criterion and satisfies the L_{Amax} 85dBA criterion at 65-70 metres from the near-side rail tracks

As part of the project undertaking noise control and management practices will form part of the operational noise management plan to assess and manage noise impacts.

10.11 Health Risks Associated with Drinking Water

This component has been based on information provided by International Environmental Consultants and the Proponent, the Wyong Areas Coal Joint Venture. The W2CP may have the following risks that could have potential implications on drinking water:

- coal dust entering domestic water tanks via roof runoff;
- subsidence affecting water quality within the water supply catchment; and
- spillages of coal, fuel or similar materials during transport to the site which may enter a water supply catchment.

Both surface facility sites are located outside the main water supply catchment however there is the potential for treated water from the underground mine to be used to supplement environmental flows or to assist new industries with a raw water supply. Treated water will also be used for onsite purposes such as dust suppression on the surface and underground, washdown and bathhouse usage.

Treated water from the mine is not envisaged to be used as a potable source however rainwater collected from buildings may well be.

It is important to note that the drinking water supply that is in part sourced from Wyong River is treated in the Mardi Treatment Plant prior to distribution to the reticulated water supply system.

10.11.1 Dust Entering Domestic House Rainwater Tanks

Although houses within the vast majority of the mine area do not have an available town water supply, most properties surrounding the surface facilities sites are connected to the reticulated town water system. These properties will be unaffected.

In order to adversely affect the quality of water within a rainwater tank, the concentrations of dust from the facilities must be sufficient to quantifiably increase the level of sediment entering the tank for which no filtration system is installed. The best measure for evaluating this risk would be dust deposition. With a conservative average dust deposition within a rural landscape of between 0.5 to 1 g/m^2/month, it is considered that rates emanating from the W2CP above these levels would have the potential to affect a property which relied solely on rainwater tanks for its water supply.

As shown by Holmes PAE in Appendix M, expected dust deposition rates both during construction and operation are around 0.2 g/m^2/month at the property boundary. Therefore it is considered that no property relying on rainwater tanks will be adversely affected by dust from the operation.

10.11.2 Subsidence Effects and Water Supply Quality

The existing water quality within Jilliby Jilliby Creek has been recognised as being of poor quality, containing high nutrient loads and bacteria. Monitoring by ERM in 2008 found that total phosphorus and reactive phosphorus levels were elevated above the 95% protection level for aquatic ecosystems at nearly all monitoring locations within the mining area. The high levels may be due to fertiliser runoff from nearby properties. Dissolved oxygen was also found to be often below the 50% saturation level considered necessary for healthy river systems. Other data from Jilliby Jilliby Creek show:

- ❒ levels of manganese often exceeded aquatic ecosystem, drinking water and recreational / aesthetic guidelines;

- ❒ levels of zinc often exceeded aquatic ecosystem guidelines;

- ❒ Levels of iron often exceeded drinking water and recreational / aesthetic guidelines;

- ❒ levels of ammonia often exceeded aquatic ecosystem and recreational / aesthetic guidelines;

- ❒ faecal coliforms regularly exceeded drinking water and recreational / aesthetic guidelines by a significant amount; and

- ❒ at the lowest sampling point, arsenic exceeded guidelines for irrigation, recreation and drinking water.

Given the current river system to be affected by mining is already of poor water quality, the W2CP will develop, as part of its environmental offset package, a riparian management plan and landowner education program designed to improve land management practices with the goal of improving overall water quality.

In the Southern Coalfields of NSW, underground mining has resulted in cracking of rock bars and creek beds resulting in water passing beneath the rock strata and re-emerging with higher levels of iron and manganese concentrations. These occurrences appear to be related to relatively saline, iron-rich groundwater seeping from mining induced fracture systems in the floor of some gorges and mixing with fresh, oxygenated stream water. The associated chemical reaction produces an iron precipitate which, though non-toxic and readily filterable, can result in unsightly staining of the rock gorge. The source of the iron is thought to be ferruginous minerals within the sandstones that form the walls to the gorges.

The valleys in the W2CP mining area are not only much broader than the gorges of the Southern Coalfield, they are filled with some 20-30m or more of alluvium. As has been described in the Subsidence Study for the W2CP EA, while some shallow rockhead fracturing in response to upsidence of the bedrock in these valleys may occur, it will do so at the base of the thick alluvial layer. Piezometric testing has shown that not only is this alluvium saturated, the water that it contains is layered – with less dense fresh water at the top and denser saline water at the base.

Therefore, in the event that shallow groundwater should emerge from fractures in bedrock beneath the deep alluvium, the potential for iron precipitation to occur is limited by:

- ❒ The chemical conditions that drive the reaction not being available
    - o Both water types will be relatively saline
    - o The interface will be in a low oxygen environment

- ❒ The sandstones in the W2CP area being less ferruginous than their Southern Coalfield counterparts.

Furthermore, any precipitation that did occur would be filtered almost immediately within the alluvium and would be essentially contained within alluvial materials of limited transmissivity.

The western portion of the W2CP underground mining area consists primarily of forested hills. During the exploration of these areas drilling operations on the ridges were hampered somewhat by an almost total loss of water circulation until the drill holes reached the level of the adjacent valley floor. This observation supports another significant point of difference between the dissected plateaux of the Southern Coalfield and the stress relieved ridges of the W2CP area.

This stress relief over geological time has resulted in well-formed joint systems in the forested hills in the western portion of W2CP that are preferred pathways for infiltrated rainwater. This infiltrated water is then gradually directed along fracture and jointing planes and may discharge though springs in the sides of the ridges. These springs are more likely to occur at interfaces of certain strata, particularly in the southern facing (down-dip) slopes. Hard rock aquifers do not occur in these well jointed areas.

With no known occurrences of iron staining from existing springs there is no basis to suggest it will result from mining activity. There is a more realistic case to suggest that the existing joint/ fracture systems may actually be enhanced by subsidence effects to potentially increase the water bearing capacity of these upland areas.

It is therefore considered that underground mining within the Wyong water supply catchment will not directly or indirectly reduce water quality and therefore there would be no additional health risks above existing risks posed by current water quality within Jilliby Jilliby Creek.

Given there is no mining beneath Wyong River and only minor potential for subsidence effects at some parts of this watercourse, the potential for any adverse water quality impacts on this component of the drinking water catchment is very low.

10.11.3 Spillages of Materials within the Water Supply Catchment

The W2CP will require the delivery of fuel, oils and various chemicals to the Tooheys Road site and to a much lesser extent to the Buttonderry Site. These materials will be transported to site by road registered trucks which will necessarily pass through water supply catchments on route. All transport companies employed by the W2CP will be required to hold all necessary transport approvals and licensing where necessary. Although the risk exists that unforseen accidents may occur, the risk associated with delivery to the W2CP is considered no greater than delivery to any other industrial site within the region.

The Tooheys Road site which will contain the coal handling and stockpiling operations is located outside the drinking water supply catchment and thus presents a nil to negligible risk for any adverse effects on drinking water quality.

10.12 Social Management and Mitigation Program

Increasingly, mine sites are being required to take account of the impact of their activities on surrounding communities and to implement strategies to mitigate negative impacts and promote positive outcomes. In developing these strategies, sites need to actively engage with their communities, in order to ensure that monitoring and management activities are focused on issues of concern to local stakeholders. Involving the community also gives legitimacy to the process by communicating to people that their views matter.

An effective tool for communicating with the community is the establishment of a Community Consultative Committee (CCC). The purpose of the CCC is to act as a conduit between the community and the project.

The CCC for the W2CP has already been formed, and is chaired by the Hon. Milton Morris AO. The CCC has already met on a number of occasions to keep the community informed of the progress of the project, and provide a mechanism whereby feedback can be provided from the community to the representatives of the W2CP.

10.13 Community Enhancement Program

It is without doubt that the project will provide significant economic benefits to the Central Coast Region. The project employment policy has set a target to source 70% of its workforce from the local region (Central Coast and Lake Macquarie area). Hunter Valley Research Foundation has estimated that 2,957 jobs are expected to be created on the Central Coast as a result of the mine's three year construction phase. In the mine's first year of operation it is expected to generate an additional 432 jobs in the Central Coast economy which will rise to 740 jobs by the sixth year of operation.

The total impact on the Central Coast economy from the three years of the mine's construction is expected to be approximately $613.6 million with significant ongoing direct expenditure in the local economy in the order of $60 million per annum. Total revenue to Government will be over $1 billion.

However it is recognised that the recipients of these benefits are not necessarily those who will be directly or indirectly affected by the mine. This includes those effects that are only perceptions since it is recognised that these are real to those who perceive them.

In response, the project has developed a Community Enhancement Program (CEP) that will be funded by the project owners and which involves specific works and actions to benefit the local community. The main component in the CEP is the development of a Community Trust which will be engaged in site specific local community projects within, and immediately surrounding, the project site and mining area.

The Community Enhancement Program would be implemented as part of a Voluntary Planning Agreement, comprising contributions in cash and in kind, as listed in Table 10.21.

The Community Trust which would be chaired by a suitably qualified person nominated by the Department of Planning. It is envisaged that members of the Trust will represent the local community, wider community, small and large business within the Central Coast.

W2CP will work with the local Council and relevant educational institutions to implement training and education programs for the project as well as to facilitate local employment opportunities within the Wyong Shire.

Table 10.21 Summary Features of Community Enhancement Program

CEP Element	What this involves	How this be funded
Community Trust Projects	Wallarah 2 Coal Community Trust to be established to manage and implement projects funded by W2CP contributions	Start-up funding plus coal production-related contributions for first 10 years of production. The Trust program to be reviewed for extension after 10 years of coal production.
Local Environment and Biodiversity Management	On site and offsite measures and actions set out in the Biodiversity and Land Management Strategy (refer to Section 16.9).	Annual cost in cash or kind each year following commencement of construction, for 5 years.
Work-Ready and Training Development	Work-ready and training development for committing to train new project employees in the region and to support local employment initiatives.	Annual cost in cash or kind each year following commencement of construction, for 5 years.
Community Infrastructure	Contribution to funds for selected key project(s) listed as a priority item in Council's Management Plan, to be negotiated with Council according to State Government guidelines.	This is an upfront payment following commencement of construction of the approved project.

The proposed Community Enhancement Program will be tailored to the needs of the local community directly affected by the proposed W2CP. By enhancing the environmental amenity of the project area and the immediate surrounding areas, a balance will be achieved between the main economic beneficiary being the State of NSW, the wider Central Coast Region and those most directly affected by the mine.