Mandalong Southern Extension Project SSD5144

Submission for Mandalong Community Association (MCA)

Draft date: 11 December 2013

Background

The Mandalong Community has been seriously impacted by the Centennial Mandalong coal mine during the past 8 or so years, the most significant impact has been a very significant social impact. While the EIS documents conclude that the overall economic and social impact of the Southern Extension Project is positive, the residents of Mandalong unequivocally argue that the social impact of the existing mine on the residents of the valley has been hugely detrimental and this will increase significantly during both the construction and life of the new proposed extension by taking noise and traffic up to the upper reaches of the valley.

The most significant impacts have been emotional and social; the community had to collect funds to take the NSW Government and its coalminer Powercoal to court to force the parties to honour the requirements of the original terms of approval in that the parties had refused to undertake a mandated flood study. The community won the case and eventually the flood study was undertaken. Shortly thereafter the mine changed hands, being acquired by Centennial Coal.

Centennial Coal redesigned the mine layout significantly reducing longwall widths and committed to limiting damage to build infrastructure to Safe Serviceable and Repairable (SSR) level. While their original predictive models were deficient in that they did not accurately predict the components of subsidence, the mine proceeded cautiously commencing with 125metre wide longwalls and they refined their modelling on the basis of actual measurements. Within a few years they upgraded their modelling and overall the mine has been able to limit damage in most instances to SSR and the subsequent modelling and predictions have been consistent and accurate.

The emotional toll of mining has been well documented and being undermined makes the process very personal. Some people have been able to cope with the stresses created reasonably well, others have struggled and many have left the valley altogether. A reasonable social barometer is attendance at the Mandalong Christmas party. Before the mine the Mandalong Christmas party was typically attended by 80 to 100 people. As Centennial bought up properties (at the peak it owned more than 40 in a valley of approximately 130 properties), people left, friction caused directly by mining split the community and at the low point fewer than 20 people attended the annual event.

About 5 years ago the leadership of the MCA identified that the physical impacts of mining appeared to be under control, though there was and is still a concern regarding four issues, residual ponding on Centennial owned properties, poor land management practices resulting in a deterioration of grazing land, the impact of water pumped out of the dam on downstream waterways and the company's weak community consultation practices. The

MCA has pushed Centennial hard on all these issues and a gradual improvement in the mine's management in these areas has been noticeable.

The MCA also identified a need to focus on rebuilding the social fabric of the community and it set about establishing a book club, film club and upgraded its web site to improve the ability of the community to communicate among its members. The MCA pushed Centennial to fence off wetlands that were being degraded by cattle half way up the valley, this has been completed with support from a NSW Government subsidy. Current projects being discussed with Lake Macquarie City Council include the construction on an entrance sculpture and signage at the mouth of the valley, near the turnoff from the motorway and a proposal to beautify a small informal rest area on Maitland Road, also at the beginning of the valley.

Proposal for Centennial Coal to upgrade infrastructure in the Mandalong valley

Some 5 years ago the MCA commenced a discussion with senior Centennial Coal staff about the coal miner giving back to the community affected by the mines operations.

The first project identified was a park including amenities and a hall which could become a focus for the Mandalong community. The only existing infrastructure in the valley is an ancient fire shed barely larger than the fire truck, which is icy in winter and sweltering in summer.

It was planned that at the new facilities mothers could meet their friends at the playground while their children played, community events including BBQs dances and film nights could be held in the hall, friends could meet for a BBQ, picnic or game of cricket, the book club could meet there and it would be the home of a community vegetable garden.

As Centennial Coal was supportive, the community representatives met with the Lord Mayor, and met with council officers to inspect the three sites suggested by Centennial Coal, a site was chosen on a piece of Centennial owned land on the corner of Deaves and Sauls Roads, and a proposal was developed for discussion, Architects were invited to give proposals for the development of schematic plans, the architects being recommended by Centennials Social impact consultants. However about two years ago the process stalled, responses from the mine slowed and the funding for the schematic planning phase has been held up for some 18 months. A copy of the proposal for the park as at the end of 2012 is attached as Appendix A.

Also over the preceding three years MCA identified several other ways in which Centennial could give back to the community. These included the following:

- There are a number of privately maintained roads on public land which are a legacy of earlier years when access tracks to homes were permitted on Lands Department road reserves. To this day these are in every way public roads except that they are privately maintained, and this has insurance repercussions for the homeowners. It was suggested that as Centennial uses these roads as if they were public roads the company might upgrade them to LMCC standards so that they would be appropriately maintained by council.

- The construction of a cycle/horse track alongside Mandalong road as the road is becoming congested relative to its width. This improvement becomes critical with the proposed construction of the mine site half way up the valley.
- The construction of a boardwalk and observation platform near the recently fenced wetlands.
- Possible link to the cycleway being built around the lake

A proposal for a VPA to improve the infrastructure of the Mandalong community

Approximately a year ago the MCA became aware of the VPA process and brought it to the attention of Centennial Mandalong through the last CCC meeting of 2012.

A short document was prepared to form the basis of discussion between the MCA and Centennial. That document is attached at Appendix B. At the CCC meeting the mine manager advised that he had no previous experience with VPAs but that he had looked into the process as a result of the MCA submission. The mine manager did advise the MCA that such agreements are between the local approval authority (in this case the LMCC) and the mine, the local community being represented by the council.

A modified MCA document regarding a VPA was also provided to the LMCC . A meeting was held between LMCC officers and Centennial specifically to discuss a VPA for the Mandalong South extension project on 15 March. The EIS document states about that meeting:

> **EIS reference P135**
> Centennial Mandalong met with LMCC on 14 December 2012 to discuss Centennial's northern projects including the Mandalong Southern Extension Project. A subsequent meeting with LMCC was held on 15 March 2013 to discuss both a future voluntary planning agreement and details of the Project. No specific issues were raised by LMCC regarding the Project and it was agreed that ongoing consultation will occur between Centennial Mandalong and LMCC.

The MCA sought to get a copy of the minutes of that meeting from LMCC and was advised that no minutes were taken.

It is disturbing to the MCA and the residents of Mandalong that the EIS document makes no mention of any specific benefits at all for the residents of the valley.

As outlined in the background section at the beginning of this document, Centennial's Mandalong Mine has severely impacted the Mandalong Community. The proposal to extend the mine to the south will take noise and traffic into the heart of the valley.

The MCA considers that it is essential for Centennial Mandalong to make a significant contribution to the residents of Mandalong if this extension project is to be permitted to proceed.

Impacts of greatest concern

Traffic and access

Traffic will increase on Mandalong Road and all roads in the valley, Centennial Mandalong staff will continue to drive on some privately maintained roads in the area adding cost to the maintenance efforts of some landholders. The increase in traffic will be different in the construction stage and the operational stage of the facility.

a. **During construction**: there will be a significant increase in traffic during the construction period, there will be a significant increase in heavy truck traffic during this period as well as workers accessing the site, this will impact on valley resident's use of the valley.
b. **During operations**: there will be a moderate increase in traffic in the valley for the life of the mine, however much of the additional traffic will be truck traffic ,this will impact on valley resident's use of the valley

There is currently no proposal in the EIS to upgrade the road in the valley and/or to provide a separate access track for horses and cyclists adjacent to the road. In some areas the road is already too narrow and consideration needs to be given to widening the road to cater for the increase in traffic.

Noise from construction and operations

The Mandalong South Services Site (MSSS) is located close to a number or residences, some of which are downhill from the site. The MCA notes what appears to be a mound around the southwest side of the site and a hill to the east. Residents who live near the site are concerned particularly about out-of-hours construction noise and long term operational noise from the site. We note that it is proposed to conduct drilling operations 24/7 and once the facility is operational, the site will generate noise at all hours of the day and night.

The EIS Executive Summary states: "It is not likely that sleep disturbance would occur as a result of operation of the MSSS". Given the quietness of the environment in the upper Mandalong valley it is critical that all overnight and long term noise from the site be attenuated to an acceptable level.

The MCA suggests that 'The Noise Guide for Local Government (http://www.epa.nsw.gov.au/resources/noise/20130127NGLG.pdf) is a reasonable and appropriate standard by which out of hours noise emissions from the site should be regulated. Specifically the section referring to impact of noise on neighbouring properties (refer page 5.9).

These comments apply to all long term out-of-hours noise emanating from the site during construction and operations and included fans, stand by generators and rock drilling.

Effect of water flows and ponding
Mandalong Road floods at a floodway above the access road, this floodway falls near the centre of the goaf and hence the water depth in a flood could potentially become deeper. The MCA is concerned that the impact on flood depths at this location should be such as to preserve the ability of people leaving their properties in case of emergency.

Water flows will be altered in some areas. Currently there is no consideration of maintaining water flows into existing dams and thereby preserving the water that farms require for irrigation and livestock in the EIS. Consideration of these issues is critical to the sustainability of agricultural activities in the valley.

The MCA is also concerned that the streams in the valley should continue to retain water where water currently stands and that there should be no unusual loss of water from the surface of the valley to underground aquifers.

Dispersible soils including tunnel soil erosion
There is some mention of dispersible soils and their influence on erosion, however tunnel soil erosion is an issue in the area and this does not appear to have been recognised, it can cause uncontrolled erosion well after the mine has completed work in an area, degrade the landscape and it can pose a risk to horse riders and livestock.

Preventative steps will need to be established wherever clearing and earthworks are proposed; special care will be required to avoid the impacts of this on the landscape.

Issues with access road
The EIS does not stipulate that the access road will be bitumen sealed; in view of the quantity of traffic during construction and the long term use of the road the MCA believed that it should be sealed to limit dust.

There is no indication of where the access road will be secured and gated. Uncontrolled access could create problems and the MCA considers that the access road should be locked immediately at the turn-off from Mandalong Road.

Relocation of power line Transgrid TL24
The relocation of the power line will have significant impact on the valley. This item of work will have a significant visual impact and will impact fauna and flora to a degree that is comparable to the mine access road and site. It will also directly affect some landholders.

A new alignment will require the clearing of land and create a new scar across the ridge to the south creating visual impacts and the risk of erosion. The relocation will also bring with it significant fauna and flora impacts, these should be considered now.

There is no consideration to the relocation of the power line in this current EIS, yet it is a significant part of the works. We request that the power line relocation be considered concurrently with the current application.

Impacts of water pumped from the mine

The MCA is concerned about the quality of water being pumped out of the mine and its impact on the streams and lakes downstream. We note that a fivefold increase in the volume of water to be pumped out at discharge point LPD001 is anticipated. We have raised our concerns at CCC meetings over the past 2 years.

The MCA obtained an independent assessment of the impact of the mine on water quality from Dr Ian Wright, an expert in this field. His opinion is attached as appendix C to this submission and the following dot points summarise his assessment.

- The current mine discharge from the licenced discharge point generally meets the EPL discharge conditions for pH; Oil & Grease and TSS. The EPL licence for the mine (EPL 365) contains the following clause:
- However the current mining operation is causing serious levels of water pollution and it currently fails to comply with its NSW EPA 'Environmental Protection Licence' (# 365). with salinity; elevated pH; nitrogen; zinc; nickel and a large number of other water attributes.
- The current operation also causes degradation to surface water ecosystems according to the macroinvertebrate data supplied by the GHD report. The EIS details the proposed increased in waste water discharges and this will probably cause a resulting increase in water pollution and degradation of aquatic ecosystems.
- The mine currently fails to meet the Director General's Requirements (DGR's) for the EIS. The Director General's Environmental Assessment Requirements "SSD-5144" issued 20 March 2012. These assessment requirements include (under 'General Requirements' – see dot-point 4):
- The study should include multiple clean reference sampling sites (for invertebrates and water chemistry) located in naturally vegetated local catchments to provide a detailed set of 'reference' data to compare with the coal mine affected sites, particularly the sites below the waste water discharge. This sampling needs to include all metals and other water quality attributes that are also reported in the other GHD report in Appendix P ('Existing Water Quality Assessment Mandalong Mine Access Site Cooranbong Entry Site.') and also conduct further assessment of sediment chemistry (as 'Macroinvertebrate and Aquatic Ecology Report – Cooranbong').
  '

Earlier in the development process for the mine expansion there was talk of building a water treatment plant and recycling all the water in the mine.

It was the MCA's view even before obtaining the independent opinion in relation to water quality (albeit this may have been a relatively uninformed view) that given the increase in volume and the risk of increase in toxicity downstream, that the option of water treatment should be seriously reconsidered.

The Association requests that the NSW Planning and Environment gives consideration to imposing a requirement for comprehensive water treatment and recycling on this project.

Cost Benefit Assessment

MCA has sought independent advice in relation to this assessment and notes that

> "the major component of the benefits of this project relate to its employment benefits (totalling to a NPV of $522 million). Labour is a cost in CBA, not a benefit. The assumption is made that any labour used in a project is not available to be used elsewhere in the economy and hence it is a cost to society as it represents a real use of resources. Additionally, the CBA presented here is only partial because it omits the capital and operating costs involved in this project (for reasons of commercial sensitivity, as the report notes). These operating costs would include the costs of employing the labour needed to construct the project and operate it over its lifetime, and so essentially this labour is being counted as both a benefit and a cost."

Green House Gas (GHG) Emission from the mine

Another issue that the MCA has raised repeatedly with Centennial Mandalong is the GHG emissions from the mine. We complement the mine on its VAMRAB trials and at long last, its action to flare the methane emissions from the mine.

The MCA has been encouraging Centennial Mandalong to use its methane to generate electricity and this has been extensively discussed at CCC meetings.

The MCA has been advised that

> "Within government CBAs in the USA carbon emissions are costed using a social cost of carbon (SCC). The SCC uses the results of integrated climate and economic models to evaluate the costs of a tonne of carbon that is emitted now in terms of the future damages it will cause. Latest values of the SCC used in the USA (see: http://www.epa.gov/climatechange/EPAactivities/economics/scc.html, for more detail) range from US$13 to US$61 (depending upon the discount rate used in the calculation) for the year 2015. The SCC is the conceptually correct value that should be used for GHG emissions within any CBA and this analysis should be amended to use these values and conduct sensitivity analysis around the range of values it takes."

The Association requests that the NSW Planning and Environment gives consideration to imposing a requirement for electricity generation on this project

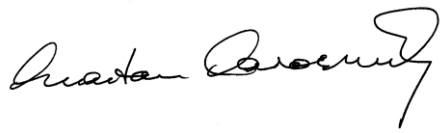
In conclusion

The MCA wishes to complement the Centennial team which has undertaken the planning and consultation for the Mandalong Southern Extension project on its professionalism and integrity. It has communicated thoroughly and effectively over the past three years and has by and large developed a responsible mine plan.

Having said this, the MCA voices its serious concerns regarding all the aspects of the project which have been addressed in this submission. It is particularly concerned regarding the proposal to pump significantly more low grade water into the natural streams downstream from the mine.

Most importantly the MCA expresses its dismay that in spite of all the detailed discussions that the MCA has had with Centennial Coal over a number of years there is no mention of any benefits to the residents of Mandalong. The Mandalong community has worked hard to create a productive relationship between the community and the mine.

The people who have been and will continue to be most impacted by this mine, the residents of the Mandalong valley, who moved to this area because of its peaceful, rural qualities, are completely ignored in the consideration of benefits in the EIS document.



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Appendix A

Mandalong park proposal developed during 2011 and 2012

MANDALONG DISTRICT COMMUNITY PARK

JUSTIFICATION AND BUSINESS CASE

THE MISSION

To build an innovative and best practice community centre and park that will draw together and nourish the rebuilding of the Mandalong community.

THE VISION

In order to realise the Mission:
Partner with Centennial Coal and Lake Macquarie Council
Galvanise community support and engagement
Engage professional, experienced landscape architects and planners

THE AIMS

1) To provide a social focal point for the rebuilding of the Mandalong community

2)To make the most of an excellent site: generous space, rural environment, green field, good visibility and location

3) To build a park that:

- Reflects best practice in innovative, modern design
- Provides social, cultural and fitness facilities
- Caters for all age groups, babies to grandparents.
- Becomes a destination in itself, servicing surrounding communities

BACKGROUND

Mandalong

Mandalong is a small rural community located between Lake Macquarie, the largest salt water lake in Australia, and the Watagan Mountains. It is 4km west of the town of Morisset and an equal distance south of Cooranbong. It is just west of the Sydney Newcastle F3 Freeway.
Most of the properties in the area are between 10 and 50 hectares, some in traditional small farming blocks but many in environmentally protected areas. There was a population of just 417 people at the 2006 census.
Typical of rural locations families had lived in the valley for many years and there was a strong sense of community and appreciation of the local environment.
In recent years Centennial Coal has purchased more than 50 properties in the Mandalong Valley. This represents more than 30% of the landholders.
The social profile of the community has radically changed as long-term owner residents are replaced with tenants. The impact has been significant.
This unavoidable sequence of events has been gradually fracturing and weakening the community engagement.
In response to these circumstances the Mandalong Community Association (MCA) has set about an intense period of community-building activities. These include regular community social events, a Book Club and film nights. In addition, a Mandalong web site has been constructed which has facilitated the organisation of community events.
The MCA is of the opinion that whilst individual community members directly affected by mining activity are receiving a range of compensations, the community overall which has suffered significant social affects, has had no compensatory consideration.

There is a strong belief that Centennial needs to provide compensation to the Mandalong community to assist in the repair of the social fabric.

Community Survey

In 2010 the MCA undertook a wide–ranging survey of community concerns and aspirations.

Key findings relating to community rebuilding issues were as follows;

When asked what community facilities their families would value most, the community came out strongly in favour of a community park with community facilities.

- Community Hall: 86% thought it was extremely important, very important or important.
- Children's Playground: 90% thought it was extremely important, very important or important.
- Park with BBQ and toilet facilities: 91% thought it was extremely important, very important or important.

As a result of this outcome a Mandalong Community Park Subcommittee of the MCA was formed. It has been active in further consulting with the community and researching a range of options.

CATCHMENT SERVED, CURRENT AND LIKELY FUTURE POPULATION

In addition to creating a hub for Mandalong community activities, the Mandalong Park would provide much needed facilities for the neighbouring communities of Cooranbong and Morisset. Both these areas have population growth expectations which will place pressure on existing facilities.

A community park with the envisaged facilities and ideally located will be attractive for locals but undoubtedly will also be used extensively by the wider community.

Mandalong Community Park -Population served

Cooranbong and Morisset

Lake Macquarie data lists combined population of Cooranbong and Morisset areas, as 17,500, with a projected doubling in the next 25 years. (http://lakemacquariecity.com.au/Morisset.html) This population is contained in an area extending from the Watagan foothills to the Morisset Peninsular (an area 20km wide by 20km deep.)
Today employment opportunities are expanding with growth in the Morriset-Cooranbong area and the wider Hunter-Central coast area. Proximity to the F3 and rail services to Sydney, combined with rapidly improving broadband Internet connectivity, is allowing increasing numbers of residents to combine working from home and commuting.
Morisset
The 2007 census population of Mandalong was 417.

SITE SELECTION

SITE ANALYSIS

There were three potential sites considered: the existing Fire shed which is Government controlled and available for community use, the Centennial Fassifern owned area on the corner of Deaves and Sauls Road (designated 12 Sauls Road) and the Tallowood site, 2.5km up Sauls Road.

The community visited all three sites. It was agreed that there were two key considerations, central location and high visibility.

Visibility is considered important from both a usage point of view (safety, oversight and as a magnet attracting use) and from the perspective of surveillance and minimising vandalism risk.

Location is considered important as one of the determining factors in use by the wider community.

The site on the corner of Deaves and Sauls Roads was unanimously agreed to as the ideal location. It has high visibility and is centrally located.

The site in Sauls Road (Tallowood) is isolated and has already proven prone to vandalism. It is very unlikely to attract use from people in the neighbouring suburbs.

The site at the existing fire shed in Mandalong road is considered to be too small (once space is made for say 40 cars the site planning is compromised and the site would be congested). The site is a considerable way up Mandalong Road and hence less visible to passing traffic. Also it is hard to imagine that the owners of the two houses immediately adjacent, who moved there seeking a rural retreat, would be pleased to have a community facility built on their doorstep.

For details see Appendix 1

TRAFFIC AND ACCESS

The proposed location of the Mandalong Community Park is 2km west of the Morisset F3 exit and 3.5km south of Cooranbong. This location is quite central, being on the most popular traffic route between Cooranbong and the F3 South.
The GHD survey of Daily vehicle traffic from Cooranbong to the F3 points out that the Deaves Road route to the F3 south is shorter and faster than alternatives, which will become much more heavily congested with the increase of local jobs. Therefore facilities on this route will become of interest to the Cooranbong population.
(http://www.planning.nsw.gov.au/asp/pdf/07_0147_ea_nc_appendixri_trafficstatement_ghd_mw.pdf)
Overall Lake Macquarie Council area growth is significant according to the ABS
http://www.abs.gov.au/ausstats/abs@.nsf/Products/3218.0~2007-08~Main+Features~New+South+Wales?OpenDocument#LOCALGOVERNMENTAREAPOPULATIONS)
The design of traffic access in and out of the proposed site safely would involve Council's roads group. Howeve,r it is proposed to have a one way traffic flow entering the site from Deaves Road some 100 metres from the Deaves Rd/Sauls Rd corner, have parking on the site close to the corner within the site and have an exit in Sauls Road by creating a widening some 50 metres from the Sauls Road corner. A small roundabout may need to be built at the corner of Deaves/Sauls Roads so that traffic wanting to return up Sauls Road would exit to the left, go around the roundabout and return up Sauls Road.

MANDALONG COMMUNITY PARK USER GROUPS

EXISTING GROUPS

A number of social events and meetings are held in the Mandalong community:

- Mandalong Book Club: a group of around 10-20 people that meets monthly with attendance increasing to include people from surrounding suburbs.
- Mandalong Community Association (MCA) General Community Meetings: 3-4 times a year with an attendance of 20-50 people.
- MCA Committee of Management meetings: 4-6 times a year
- MCA Mining Subcommittee meetings: as required
- Mandalong Community Christmas party: late November/early December each year with an attendance of 30-50 people.

- MCA community BBQ: four times a year with an attendance of around 20 – 30 people

- Mandalong Film Club: a group of around 20 people that meets monthly with attendance increasing to include people from surrounding suburbs.

These events are currently held in the homes of local people, which by definition limits their size and frequency, or at the Fire Shed location which is not suitable for children and has inadequate space and facilities.
A Community Centre would provide a more comfortable and suitable venue ensuring attendance and frequency of Mandalong social events will increase and flourish.

POTENTIAL GROUPS

Potential future use of a community building, playground and open space for Mandalong, Cooranbong and Morisset residents could include:

- Recreation and sport

- Cultural events
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- Community info days /events held by Centennial Coal

- Fitness classes, such as yoga, Pilates

- Mothers group/play group

- Bocce

- Community garden

- Hire out for private functions such as Birthday parties, weddings

- Hire out for the use of other community groups and training organizations; art and craft classes, CEN network training, NPA, Men's Shed meetings, school holiday activities, etc

- Markets: second hand items/local produce/art and craft

- Fire Brigade Information days/Fire and flood evacuation gathering point.

- General community use of the park/playground facilities

- Congregation place for organised bike rides and bush walks

- Community social events

THE MANDALONG COMMUNITY PARK VISION

VISION FOR THE SITE

To create a professionally designed, best-practice community park consisting of a community building, playgrounds and open spaces that caters for all ages and provides facilities for social, cultural and fitness activities.
The site would include:
A Community Centre building and facilities.
Adequate, safe car parking with separate entrance and exit. .

A secured playground for young children. This area would be near and in clear sight of the community building and terrace. It would be partly covered and have tables and seats for accompanying adults. Suitable safety Under-surfacing would be required. This area could be themed eg native wildlife. Today many innovative play equipment items are available for young children's play. See Appendix 3

An adventure/fitness playground area for older children. This area would also be near and in clear sight of the community building and terrace. Given the nature of the site there will be opportunities to build creative activities from natural materials and combine them with the enticing commercially produced equipment available today. See Appendix 3
A large open space designed and landscaped to cater for market stalls, ball games, bocce, etc
An amphitheatre with stage, catering for approximately 200 people
An extensive walking track including exercise equipment at certain points
A bike track including challenges/equipment such as "bikemania" See Appendix 3
A fenced community garden with shed and rainwater tanks etc.
Plantings of shade trees indigenous to the area
Outdoor lighting
Pathways
Seating benches, rubbish bins
Fencing

Disability access throughout.

VISION FOR THE COMMUNITY BUILDING

To provide a community building of approx 250 sq metres, with space to accommodate social, cultural and fitness activities and events of up to 100 people.

The building would:

Be professionally designed as an attractive modern structure that would complement the surrounding rural landscape and fully utilise the position and views.

Take advantage of natural light and wind directions for ventilation and cooling. Have solar power, water tanks, ceiling fans, insulation and maybe a combustion fire.

Have large windows for light and views, and doors leading to an outside terrace area with preferably a north – north east aspect that has views.

Feature a spacious fully covered terrace/veranda that would be large enough for portable BBQs, tables and chairs.

Have a main open interior that would accommodate 100 people seated. It would require stackable staging, tables and chairs.

Include at least one separate room for small group activities/ meetings of up to 12 people. The building would also have a number of secured storage facilities for user groups e.g. play groups and fitness groups.

Have a fully equipped food preparation and serving facility and bar/serving area. Additional facilities would include a portable outdoor BBQ for community events/private hire.

Include power points, internet, TV connectivity, and PA stereo and/or microphone facilities for events. Some wall area for a whiteboard (or use a portable one) and bulletin boards/art work/notice boards.

Have toilets, with a bathroom facility, possibly a shower. Toilets able to be accessed from both inside and outside the building.

Have easy and well lit accessibility from the car parking area including a covered entrance/porch space.

Have disability access throughout.

FINANCIAL CASE

CAPITAL INVESTMENT

The preferred site in total is 70 acres. This is insufficient for subdividing into two allotments and excising 10 acres from it on the Deaves Road frontage would not inhibit the use of the balance of the site.

Any future owner would build a house up towards the top of the site to gain views and the NE breezes. This would create a significant and sufficient buffer between the occupants of the corner block and the community facility. This would mean that if Council consents to the subdivision, the value of Centennial's land would not be decreased and the cost in creating the allotment for the park would be the surveying and registration costs.

The capital cost would then be the cost of creating the facilities themselves. The MCA assumes that as a ball-park estimate, an expenditure of approximately $150,000 to $200,000 per annum for 3-4 years could create the core facilities in stages over a three-four year period.

Once agreement in principle is reached a detailed plan, and costing would follow.

GOVERNANCE, MANAGEMENT AND MAINTAINANCE

It is anticipated that ownership of the site would transfer from Centennial Coal to Lake Macquarie Council on behalf of the Mandalong community.

It is proposed to establish a trust and a Board of Trustees for the management of the facilities. This board would be made up of representation from the Mandalong Community Association, Lake Macquarie City Council and Centennial.

Under the Board of Trustees, a Mandalong Community Park Operating Committee would have the responsibility for the ongoing operation and maintenance of the facilities.
It is proposed to run the facilities with a positive cash flow, with all running costs being covered by the income generated by the use of the facilities.

The role of Lake Macquarie Council would be: to assist with design, planning and project management, to provide all necessary insurances on an on-going basis and to engage with ongoing management of the facility via representation on the Board of Trustees.

The role of Centennial Coal would be:

- To transfer title of the site to Lake Macquarie Council including survey and legal costs.
- To fund the site development and building costs over a 3-4 year period.
- To provide ongoing security services to the site for the duration of Centennial's mining operations at Mandalong Mine.
- To provide some ongoing maintenance services as required for the duration of Centennial's mining operations at Mandalong Mine.
- To engage with ongoing management of the facility via representation on the Board of Trustees

The role of the Board of Trustees would be:

- To manage the use and upkeep of the site and facilities on behalf of the Mandalong Community.
- To manage regular maintenance, such as lawn and garden care, via community involvement.
- To manage the ongoing funding of running costs, such as power, via a program of income generating activities.
- To engage with Lake Macquarie Council and Centennial Coal.

INCOME STREAM

The main source of income would be from the private hire of the community centre. A venue in Mandalong with great facilities that are comfortable and child friendly, has adequate parking and accessibility, all in a rural setting (such as the site proposed with surrounding views of country side and forest) would be attractive for private hire.

Other venues similar to the proposed community centre have a private hire day/evening fee of $350 - $600, with a bond of between $300 - $3000 depending on the function. There can be an extra fee for the hire of the kitchen facilities of around $40.
Hourly hire rates, depending on numbers of people and number of hours of hire required could generate income of between $12 and $32 per hour. This is based on other local venue hire fees.
Fee rate would be dependent on the activity for which the venue is being hired. For example not-for-profit community group activities such as playgroups would have fees at the lower end of the scale. A hire fees and charges schedule would be developed. See Appendix 2
Other possibilities for an income stream could include fees for regular exercise classes (such as Yoga, after the instructors fees are considered – around $40 an hour for a Yoga Instructor). There could be a small attendance fee for community run interest groups such as Book Club, Film Club, and Bocce etc. Market stall holders could be charged a small fee for a stall space.

APPENDIX 1

Mandalong Park Project

	1 Fire shed site	2 Cnr Sauls/Deaves	3 Tallowood
Total area of land required (i.e. area of each component including car parking and other requirements)	less than acre available	10 acres	10 acres
Owner - is the land owner agreeable to the proposed future use	NSW Govt admin by LMC suggested by LMC	Centennial Fassifern To be determined. Part of project cost	Centennial Fassifern Suggested by Centennial. Part of project cost
Zoning - Is the proposal permissible in the zone	Yes	Will be with new zoning	Will be with new zoning
Planning Controls	Existing use	Will need council permission	Will need council permission
Utility Services - water and electricity	Electricity/will need tank water	Electricity/will need tank water	Electricity/will need tank water
Development Constraints - removal of native vegetation, if necessary	Only one acre cleared. At least three acres of virgin native bush would need to be removed.	No clearing required	No clearing required, but dam infilling will be needed for safety.
Native Vegetation - Identify the Vegetation Community, likely Endangered Ecological Community, flora or fauna issues	Yes, significant	None	Possibly
Bushfire Issues	Yes	No	Yes
Slope	Slope, badly drained	Well drained	Flat, frost prone
Catchment Served - how central is the location to the population (identify the boundaries of Mandalong)	Out of way	Prominent	Out of Way
Natural Resources - Mine Subsidence	To be undermined	Subsidence finished	To be undermined
Contamination	Nil	Nil	Asbestos
Soil Suitability - any acid sulphate soils or soil limitations	area so small no plantings possible	Farmland	lot of non native trees and shrubs overgrowing site, so acid soils unlikely
Shade	Too much shade	Some trees	Some trees
Flooding and Drainage	Poor draining	Well drained	Poor draining
Visual Impact	Removal of significant bush area, likely to strongly resisted by neighbours.	Replacing old building	Replacing old building
Traffic and Access	One entrance/exit	Can have sep entrance/exit	Can have sep. entrance/exit
Surveillance - vandalism	Overseen by neighbours	Lot of passing traffic	Out of the way, recently vandalised/stripped of materials over several days
Cultural Significance - Aboriginal and European	Historic European site	Nil	Unknown
Costs - Establishment and ongoing costs	6km from CM	Close to CM (1km) for maintenance	5.5km from CM

Income stream	Out of way, too small	Prominent/central maximised	Out of way, not child friendly (number of dams close to site)
Funding Opportunities	Only building to be funded	Land and building need to be funded - but clearly best value for CM & community	Land and building need to be funded

Appendix B
MCA submission to Mandalong Mine in October 2012 regarding a VPA

Proposed strategy for meeting the association's objectives
The Association has become aware that under The Environmental Planning and Assessment Act 1979 (the EP&A Act) there is provision for Voluntary Planning Agreements (VPAs) between a developer (miner) and the community, under which the developer provides a development contribution for a public purpose.

The MCA considers that this mechanism offers an ideal model under which the Centennial Mandalong Mine could make a contribution to community projects such as those listed above as the need and opportunity for them arise.

Proposed mechanism
The MCA has noted the use of VPAs in mining development by BHP, Coal and Allied, Xstrata, Moolarben Coal Mines and Whitehaven Coal as a mechanism for the mines making a contribution to the local community. It also notes that the rate of community support has ranged between 6 and 15 cents per tonne.

As a key component of its application for the Mandalong South Extension, it is requested that Centennial Mandalong Mine considers entering into a VPA with the Mandalong community with the funds managed through a trust with Centennial and broad community representation. The funds would be applied to projects such as those listed above and rather than these being considered at the CCC meeting, the board of the trust would consider the management and application of the funds.

It is proposed that the contribution be set at a rate of 12 cents per tonne from the commencement of the new Mandalong South Extension works. An alternative which would be preferable to the community would be for a lower rate of support from the time that Centennial receives approval for the Mandalong South Extension (based on current mining tonnages).

APPENDIX C

Impact of the Mandalong Southern Extension EIS on surface water quality and aquatic ecosystems

9 December 2013. By Dr Ian A. Wright. Freshwater Scientist.

Centennial Mandalong is currently causing water pollution

It is my professional opinion that the current coal mining operation (Centennial Mandalong) is currently polluting the surface waters of the Lake Macquarie catchment, according to Section 120 of the NSW *Protection of the Environment Operations* Act (1997). This is based on my assessment of water quality data provided in the Centennial Mandalong Environmental Data; the mine's waste water discharge licence (Environment Protection Licence 365) and the NSW *Protection of the Environment Operations Act* (1997). In addition this is supported by information provided in the Mandalong Southern Extension EIS and in particular in two sub-reports in Appendix P (Water Management Impact Assessment). These two reports in Appendix P are by GHD and are named 'Existing Water Quality Assessment Mandalong Mine Access Site Cooranbong Entry Site' and 'GHD Macroinvertebrate and Aquatic Ecology Report'.

The current mine operation is not meeting its EPA Environment Protection Licence (EPL) requirements. The only pollutants that are permitted to be discharged from the Colliery (according to EPL 365) are:

- Oil and Grease (10 milligrams per litre)
- pH (6.5-8.5 pH)
- Total Suspended Solids (50 milligrams per litre)

The mine discharge from the licenced discharge point generally meets the EPL discharge conditions for pH; Oil & Grease and TSS. The EPL licence for the mine (EPL 365) contains the following clause:

'L2.3 To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in the table\s.'

The self-reported data provided by 'Centennial Mandalong Environmental Monitoring Data' October 2013 includes data on a comprehensive suite of water quality attributes. Of most immediate concern is that the discharge from the mine to local waterways is highly saline. The self-reported data shows that the two samples reported their October 2013 report had electrical conductivity of 3820 and 4050 µS/cm.

The ANZECC (2000) *Water Quality Guidelines for Protection of Aquatic Ecosystems* (see table 3.3.2) provides guidelines for lowland rivers in south east Australia which include default trigger values of 125-2200 µS/cm, with associated text stating 'NSW coastal rivers are typically in the range 200–300 µS/cm'. This means the appropriate guideline for water salinity the Mandalong Southern Extension EIS is 300 µS/cm. The current mine discharge is 13.5 to 19.1 times higher than the guidelines. This indicates that the existing mine discharge has caused salinity pollution and this is in contravention of clause 'L2.3' of EPL 365.

The many metals reported in 'Centennial Mandalong Environmental Monitoring Data' also indicate that the mine is currently causing metal pollution, particularly for Nickel. Nickel concentrations of 59 to 61 µg/L are at levels higher than ANZECC (2000) guidelines ('Trigger Values of Toxicants' see Table 3.4.1). Other elevated metals of concern are Boron, Barium, Lithium, Molybdenum, and Zinc. Modification of stream geochemistry, according to 'Centennial Mandalong Environmental Monitoring Data' from the mine discharge to local surface waters indicate that highly elevated calcium, potassium, sulphur and sodium is another theme of water pollution.

It is evident that Centennial Mandalong is discharging mine wastewater into the local surface waters that includes pollutants at hazardous concentrations that may damage aquatic species (of most particular concern: Nickel and Salt).

My concern that the mine is currently polluting surface water quality, and that this is having strong adverse impacts on aquatic ecosystems, is also supported by information provided in the GHD report in Appendix P 'GHD Macroinvertebrate and Aquatic Ecology Report' and the GHD Report 'Existing Water Quality Assessment Mandalong Mine Access Site Cooranbong Entry Site.' These reports show that the pollutants salinity; zinc; nickel; and oxidised nitrogen are contaminating surface water and the metals (zinc and nickel) are also contaminating stream sediment at levels hazardous for ecosystems.

It is of great concern that none of these pollutants (salt, nickel, zinc and oxidised nitrogen) are permitted by the NSW EPA (as specified in Environment Protection Licence 365) to be discharged from the mine. It is recommended that a much more detailed assessment of water quality and stream ecosystems be conducted. I provide further detail in my conclusion about the need to conduct a more rigorous water quality and stream ecology study. Such a study is needed to specify discharge conditions for these pollutants (salt, nickel, zinc, oxidised nitrogen) that will achieve the aims of the Protection of the Environment Operations Act.

I strongly reject the continuation of the previous EPL 365 discharge conditions (based on oil & grease; pH and total suspended solids) for the proposed development. Effective minimisation of water pollution from the proposed development will require strict discharge conditions (based on ANZECC water quality guidelines) for salt, nickel, zinc and oxidised nitrogen in addition to the existing guidelines for oil & grease, pH and suspended solids.

Centennial Mandalong is currently not complying with its Environmental Protection Licence 365. It is polluting waters with pollutants not permitted under EPL 365 (Clause L 2.3).

The Mandalong Mine Southern Extension Project provides inadequate data to enable a complete assessment of the proposed mine extension of the key issue of potential impacts on water resources

In my opinion the extensive documentation provided as part of the EIS for the Mandalong Southern Extension EIS provides inadequate environmental and ecological data to enable a complete assessment of the future environmental impacts of the proposed development.

It is my expert opinion that this fails to satisfy the Director General's Environmental Assessment Requirements "SSD-5144" issued 20 March 2012. These assessment requirements include (under 'General Requirements' – see dot-point 4):

- detailed assessment of the key issues specified below, and any other significant issues identified in this risk assessment, which includes:
  a description of the existing environment, using sufficient baseline data;

The Director General's Environmental Assessment Requirements "SSD-5144" listed the following instructions under the 'key issues' with clear instructions that:
'*The EIS must address the following specific issues:*
Water Resources - including: detailed assessment of potential impacts on the quality and quantity of existing surface and ground water resources, including:

- *detailed modelling of potential groundwater impacts; and*
- *impacts on riparian, ecological, geo-morphological and hydrological*

- *values of watercourses, including environmental flows;'*

Impact of the proposal on surface water quality

Further information on this issue is available in the GHD report in Appendix P 'Existing Water Quality Assessment Mandalong Mine Access Site Cooranbong Entry Site'.

This report offers inadequate data on existing water quality. For example, for 'upstream' water sampling sites 'SW008 and SW011' offer a relative rich data set for Salinity (Electrical Conductivity) of 57 and 60 observations. Salinity is a major issue for the current mine discharge (see 'Centennial Mandalong Environmental Monitoring Data' October 2013). However the EISA 'Appendix P' reports no Nickel data for the two sites 'SW008' and 'SW011'. Nickel is a key pollutant from this project, see Appendix P 'Macroinvertebrate and Aquatic Ecology Report, Cooranbong Entry Site' which highlights the water pollution and adverse ecological impact of salinity and nickel.

Nickel and zinc concentrations (presented in Appendix P Water Quality Assessment Mandalong Mine Access Site Cooranbong Entry Site') are often elevated at levels potentially toxic to aquatic ecosystems, but very limited historic data is presented to make a complete assessment of the changes in nickel and zinc (and other toxicants) due to the mine waste discharge.

The EIS uses an incorrect water quality guideline for salinity. It uses the default ANZECC (2000) for south eastern Australia lowland waterways of 2200 µS/cm. The detail of the relevant table in the ANZECC (2000) Table 3.3.2 has an explanatory note 'Low values are found in eastern highlands of Vic. (125 µScm-1) and higher values in western lowlands and northern plains of Vic (2200 µS/cm)'. As my report details previously, the ANZECC provides a very clear explanatory note that 300 µS/cm is the appropriate guideline for this area 'NSW coastal rivers are typically in the range 200–300 µS/cm'. In my opinion it is incorrect and misleading that the 2200 µS/cm value is used in this EIS. The implications of this is that the salinity pollution caused by the coal mine discharge, as described in the EIS and associated documents, is of a more damaging scale than the EIS describes.

Impact of the current coal mine discharge (comparison of upstream sites 'SW13 and SW14') versus the sites below the mine discharge (LDP001 and SW16 and SW17)

The following text contains my assessment of the impact of the mine on local surface waters (unnamed creek) from the data provided in 'Appendix B Existing Water Quality Assessment Mandalong Mine Access Site Cooranbong Entry Site'.

pH: The mine discharge is generally increasing water pH with pH downstream mildly to highly alkaline at LDP001, generally 7.5-9.0. This is much higher than upstream sites (SW16 and SW17) which had pH in the range 5.0 to 7.5.

Salinity: There was inadequate upstream salinity data presented from sites SW13, SW14 and SW15, with only data from July 2011 to early 2013. It was difficult to interpret the data from visual assessment of the figure 'B.2-3'; but electrical conductivity was mostly less than 500 µS/cm upstream of the project discharge site. In contrast, salinity downstream of the mine discharge was much higher.

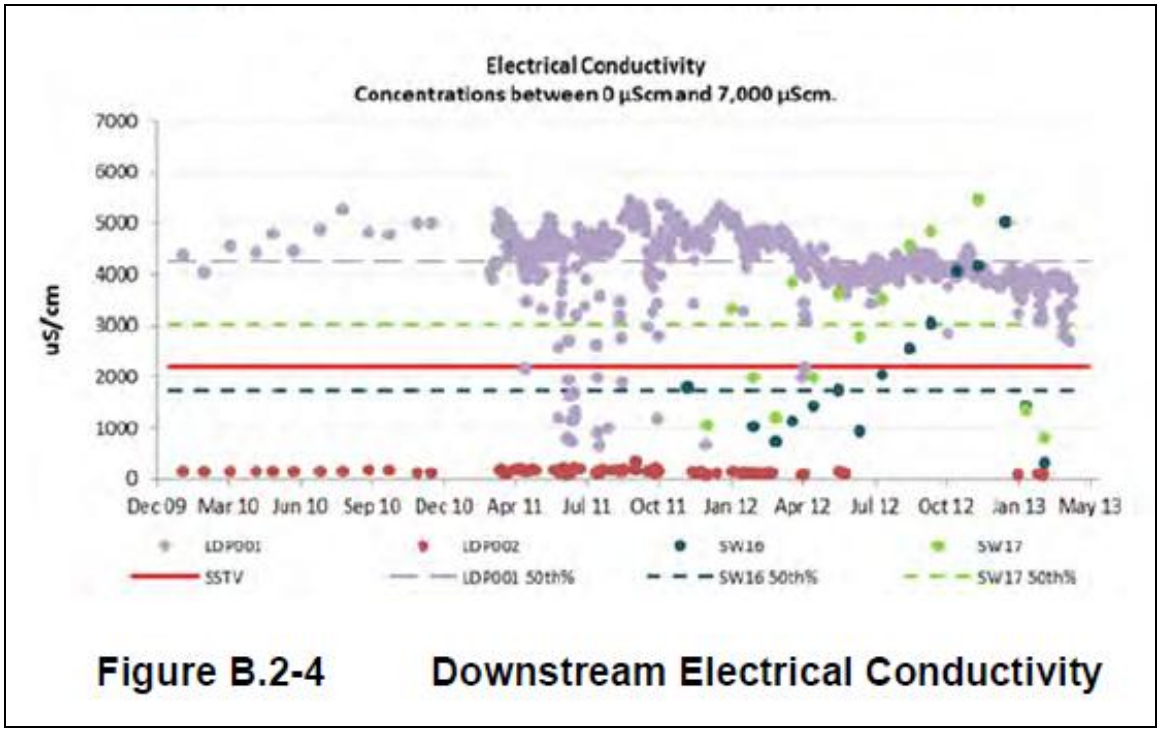

Figure B.2-4 Downstream Electrical Conductivity

Figure B.2-4 (from Appendix B) shows that a much more detailed dataset is available for sampling sites downstream of the mine discharge, with data from 2009 to early 2013 and very detailed regular observations from April 2011. This figure clearly shows that salinity levels are highly elevated below the mine and at site LDP001 are generally in the range 3000 to 5000 µS/cm. Such levels are indicative of saline pollution and are 10 to 16.6 times higher than the ANZECC (2000) trigger value for ecosystem protection. Although saline data collected upstream was inadequate, nonetheless the limited data was generally less than 500 µS/cm and demonstrates that the mine discharge is causing significant salinity pollution.

Nickel:

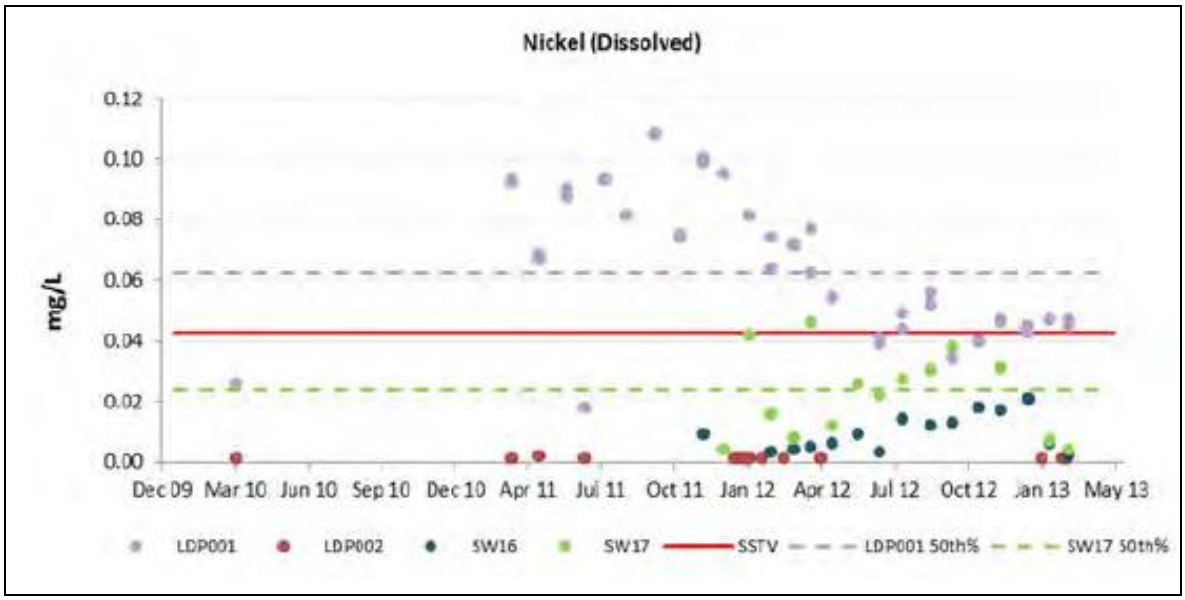

Figure B.2-27 (Nickel (Dissolved)) shows that downstream concentrations were highly elevated. Appendix B reports that nickel levels were below 0.04 mg/L. The mine discharge (LDP001) had nickel (dissolved) concentrations often higher than the 0.04 mg/L trigger value. This indicates that the mine is causing nickel pollution at levels hazardous to aquatic ecosystems. ANZECC guidelines suggest that nickel may be hazardous at levels of 0.008 to 0.017 mg/L. Hardness data is not provided to enable an

assessment of the appropriate ANZECC 'Hardness Corrected Nickel Trigger Value' for nickel levels and protection of aquatic ecosystems.

Ecological impacts (macroinvertebrates)

According to the GHD 'Macroinvertebrate and Aquatic Ecology Report – Cooranbong' the impact of the current mine discharge to aquatic ecosystems was assessed using a single collection of macroinvertebrates. A total of 6 sites were sampled with two of the sites selected as 'control' sites away from the mine discharge. Two sites represented the mine 'on-site impact' and one site 'downstream impact' and one site further downstream, also 'downstream impact'. The collection of freshwater macroinvertebrates was made on one occasion (24th and 25th July 2012). The methodology used followed AUSRIVAS methods and included family-level identification. The ANZECC (2000) water quality guidelines provide clear advice that AUSRIVAS is a method that has limitations for detecting and measuring ecological impacts. The data collected and reported in this EIS on macroinvertebrates is of poor quality and much more detailed data (based on spatially and temporally replicated data) is urgently required to enable a rigorous scientific assessment of the impact of the coal mine wastewater on aquatic ecosystems.

In my opinion this is an inadequate data set to make a complete scientific assessment of whether or not the mine discharging is causing any adverse impact to aquatic ecosystems. I have a number of concerns:

- For the scale of the impact and the task of detecting and measuring any impact a single round of samples is inadequate. Additional rounds of sampling (seasonal sampling would be appropriate).
- Collection of samples from mid-winter is questionable. As explained above, seasonal sampling should be repeated.
- The methods used are qualitative – for impact detection the relative abundance of invertebrates is very important. Multiple spatial quantitative samples should be collected at each sampling site on each occasion.
- The methods used do not involve replicated sampling. I would expect a pollution assessment study to have a rigorous spatial and temporal replicated sampling design.
- The methods used family-level assessment. Species-level would offer a more detailed assessment.
- In summary – the macroinvertebrate sampling was very coarse and offered very limited statistical 'power' to detect and describe any ecological impact.

The macroinvertebrate results yielded from this sampling did detect an ecological impact. The waterway is currently polluted and has degraded ecosystems yet this is based on an inadequate sampling program and poor quality data. It had very few sampling sites, did not conduct multiple repeated sampling. The MDS plot below shows that the 'impact site' appears to have a different assemblage of macroinvertebrates to control sites (and the single 'recovery' site. However the inadequate number of samples greatly limited the ability to test whether this was statistically significant. Further sampling of macroinvertebrates with a rigorous scientific design (including replicated spatial and temporal samples is required). I agree with the '5.0 Conclusion and Recommendation' sections of the GHD report 'Macroinvertebrate and Aquatic Ecology Report – Cooranbong' which also criticises the lack of spatial and temporal replication.

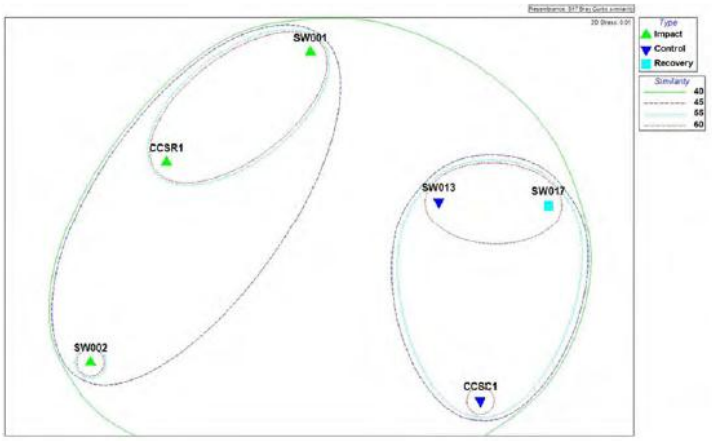

Figure 3-12 MDS Plot of Macroinvertebrate Samples Displaying the Similarity of Sites Based on the Site Type

The MDS plot (Figure 3-12) showed a grouping of 'impact' samples away from the control and 'recovery' site. This plot indicates a strong ecological impact – but the accompanying ANOSIM results reveal the inadequate statistical power (Table 3-4). From my experience the 'possible permutations' column should be in the thousands. This has influenced the statistical non-significance of the results, yet the 'R-Statistic' indicates a very different macroinvertebrate fauna is present in the impact compared to the control sites. See my previous comments in the text above the MDS plot for my recommendations on the urgent need for much more detailed macroinvertebrate data.

Table 3-4 ANOSIM Results of In Situ and Laboratory Water Quality Variables Considering the Influence of Site Type

Groups (Site Types)	R Statistic	Significance Level %	Possible Permutations	Actual Permutations	Number >= Observed
Impact, Recovery	1	25	4	4	1
Impact, Control	1	10	10	10	1
Recovery, Control	0	66.7	3	3	2

The text below (taken from the GHD report 'Macroinvertebrate and Aquatic Ecology Report – Cooranbong') provides clear support for my concerns that both water quality and aquatic ecosystems are adversely impact by the existing coal mine 'impact'. The authors conclude that contaminated water quality by salinity (they term this 'EC'); pH; oxidised nitrogen (they term this 'NOx') and dissolved nickel. They also mention zinc and nickel contaminated sediment, although they question the quality of the methods.

The following section of text is copied from the GHD Macroinvertebrate and Aquatic Ecology Report:

'5. Conclusions and Recommendations
The limited nature of this study, in a low number of study sites and a lack of consideration for temporal and seasonal variation, may not have been sufficient to establish definitive causal relationships between water quality, aquatic ecosystem conditions and macroinvertebrate communities at this stage. However the following general statements can be made to summarise the aquatic assessment:
 Water quality at the impact sites was considered to be different to the control sites and parameters which were outside the ANZECC & ARMCANZ (2000) trigger values at impact sites (primarily EC, pH, NOx and dissolved nickel) were generally inside the triggers at control and recovery sites.

Although this did not seem to influence the presence of the known sensitive macroinvertebrate taxa, it was shown to be a likely cause of variation in the macroinvertebrate community composition at the impact sites. Further assessment of the toxicity of the discharge water is provided in GHD (2013).
 Sediment analysis reported some elevated total metal concentrations at the impact sites (primarily nickel and zinc), although the bioavailability of these metals is unclear based on the sampling that has been undertaken.
 Aquatic habitat across the study area was considered to be in a slightly to moderately modified condition and although there were some differences between impact and control, it was unclear the level of influence these variations may have on macroinvertebrate community composition.
Consideration could be given to improving overall ecosystem health of the discharge receiving aquatic habitat by:
– Removal and management of riparian weeds including Lantana.
– Improvement of flow through the systems in the aim of reducing sedimentation and sediment anoxia.'

My conclusions:

The EIS documentation provides grossly inadequate data for an operation of this scale. However, the information is sufficient to show that the current mining operation is causing serious levels of water pollution and it currently fails to comply with its NSW EPA 'Environmental Protection Licence' (# 365). The current operation contaminates surface waters with salinity; elevated pH; nitrogen; zinc; nickel and a large number of other water attributes. The current operation also causes degradation to surface water ecosystems according to the macroinvertebrate data supplied by the GHD report. The EIS details the proposed increased in waste water discharges and this will probably cause a resulting increase in water pollution and degradation of aquatic ecosystems.

These issues are very serious and demand an urgent response.

I repeat my concerns that the information on surface water chemistry and ecology is inadequate. In my opinion it fails to meet the Director General's Requirements (DGR's) for the EIS. The Director General's Environmental Assessment Requirements "SSD-5144" issued 20 March 2012. These assessment requirements include (under 'General Requirements' – see dot-point 4):

- detailed assessment of the key issues specified below, and any other significant issues identified in this risk assessment, which includes:
  a description of the existing environment, using sufficient baseline data;

In particular, a single mid-winter round of macroinvertebrate sampling of stream macroinvertebrates, lacking spatial or temporal replication (with resulting very low statistical power) epitomises the inadequacies of 'baseline data' provided for this EIS. In my profession of water science such data would be unpublishable. If data of this standard was submitted to a quality scientific journal in this field, it is my opinion that it would be rejected. For such an important development it is my expectation that the data collected should meet all DGR's and be of publishable quality in professional industry journals.

I recommend that further macroinvertebrate and water chemistry sampling be conducted of a standard that is scientifically rigorous and would be of publishable quality. Water pollution and ecological damage from the existing coal mine is a major issue and it is not possible to form a strong conclusion about the impact of the existing coal mine, let alone make an assessment of future impacts in the absence of 'sufficient baseline data' for this key issue. In my opinion the macroinvertebrate and water chemistry survey needs to include more sampling sites and be repeated on several occasions. At each site replicated quantitative species-level macroinvertebrate data needs to be collected. The study should include multiple clean reference sampling sites (for invertebrates and water chemistry) located in naturally vegetated local catchments to provide a detailed set of 'reference' data to compare with the

coal mine affected sites, particularly the sites below the waste water discharge. This sampling needs to include all metals and other water quality attributes that are also reported in the other GHD report in Appendix P (‘Existing Water Quality Assessment Mandalong Mine Access Site Cooranbong Entry Site.’) and also conduct further assessment of sediment chemistry (as ‘Macroinvertebrate and Aquatic Ecology Report – Cooranbong’).