ENVIRONMENTAL ASPECTS OF MINE PLANNING

Wendy Tyrrell [1]

ABSTRACT: Underground mining has occurred in the Illawarra region for more than 150 years. Over time, community expectations about the environmental effects of mining and other developments have changed dramatically. It is in this context that community, government, and environmental groups have raised concerns about the effects that mining can have on rivers and other natural features, residential property, and infrastructure, such as transmission lines, roads, and bridges. On natural features, these effects can include fracturing of the rock bedding in the river, water loss to the shallow sub-strata, gas release, rock falls, and vegetation dieback.

In the past, mine planning has considered potential effects on engineered structures, however, the same attention has not been paid to the effects of mining on natural features. Through a Stakeholder Involvement Programme conducted by Illawarra Coal, it was identified that government and community stakeholders were seeking a more sensitive approach be taken to mine planning, particularly in significant and high risks areas. As a result, mine planning processes are being reviewed to take into account the effects of mining on the surface features.
The focus of this paper is the programme undertaken by BHP Billiton – Illawarra Coal to integrate environmental assessments into mine planning. This has involved internal workshops and projects, together with external consultation. The process that the company is utilising to fully incorporate environmental assessments into the mine planning process is described.

The purpose of this process is to identify surface features, determine their sensitivity, develop mitigation and remediation options, and potentially avoidance measures early in the mine planning process. Another key aspect of the process is to incorporate internal and external stakeholder feedback as part of the mine planning process.

In implementing this process, it is anticipated that it will provide a more secure outcome for the business. This is expected to occur through understanding and addressing environmental issues and incorporating stakeholder feedback early in the mine planning process, therefore minimizing the risk of costly changes to mine plans being required within short time frames.

The rigorous Integrated Mine Planning Process (IMPP) will give the business confidence that the mine plan submitted through the Subsidence Management Plan (SMP) application to government has the highest probability of approval and will provide the most sustainable outcome – for the environment, community, and Illawarra Coal.

INTRODUCTION

BHP Billiton - Illawarra Coal is a coal mining business operating in a sensitive locality about 1.5 hours drive to the south of Sydney, Australia are shown in Figure 1.

The Illawarra Coal business produced approximately 7 million tonnes of premium-quality coking coal during the financial year to June 2003. The coking coal is utilised in the production of steel at the Port Kembla Steelworks in New South Wales, Whyalla Steelworks in South Australia, and by overseas customers.

Mining has occurred in the Illawarra region for more than 150 years. Over time, community expectations about the environmental effects of mining and other developments have changed dramatically.

In this sensitive area, the operations must be sustainable within the context of urban pressure and sensitive ecological environments**.**

[1] Manager Environment and Sustainable Development, BHP Billiton – Illawarra Coal

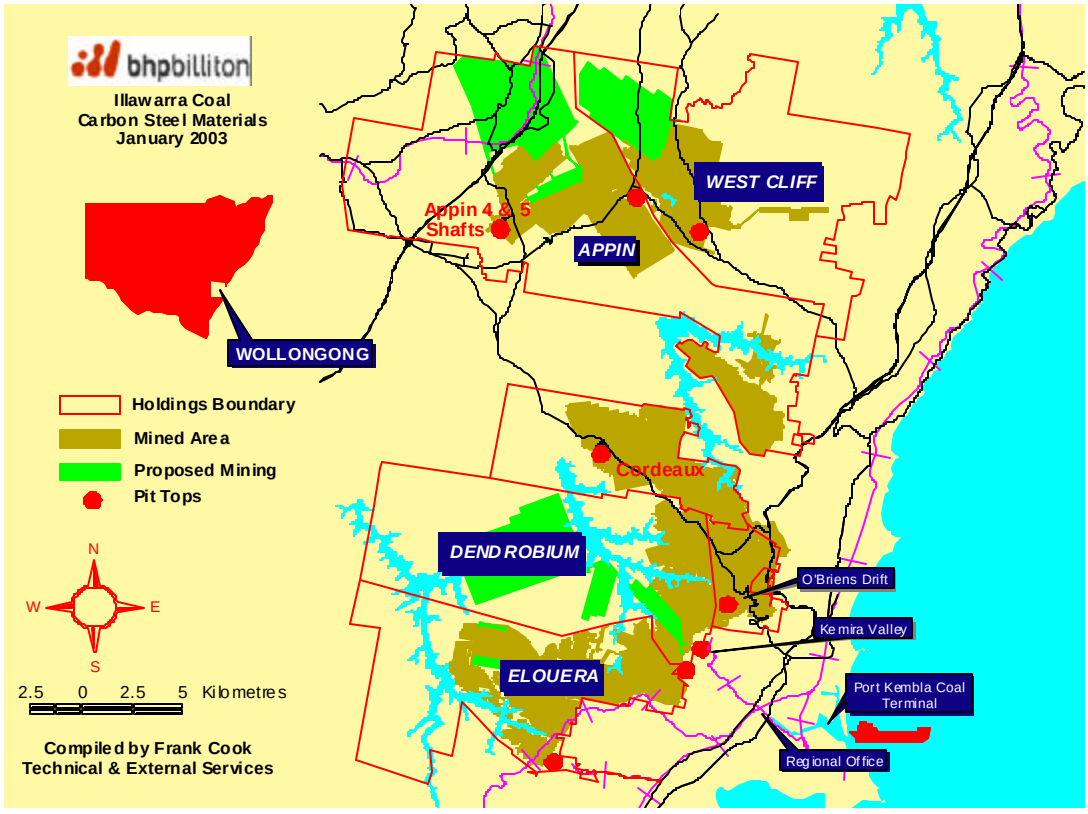

Fig 1 – BHP Billiton Illawarra coal operations including lease boundaries, current and proposed mining areas, and previously mined areas

As with many businesses, Illawarra Coal has recognised that future success is contingent upon achieving sustainable outcomes, including sustainability in environmental and community terms. These requirements represent one of the greatest challenges that lie ahead for the success of the Illawarra Coal business.

In 2002, Illawarra Coal commenced an extensive stakeholder consultation programme to identify stakeholder issues related to its underground mining operations. The program was facilitated by Coakes Consulting, who are social management specialists. It included individual interviews with over 100 stakeholders, including state and local government agencies, local residents, environmental and community organisations, indigenous groups and local businesses. In addition, a telephone survey of 1400 households, randomly selected from across the Wollondilly and Wollongong Local Government Areas has also been undertaken to assess community attitudes towards mining.

A key environmental issue facing the business is that mining under rivers and other natural features can cause fracturing of stream-beds, redirection of water to shallow sub-strata, water quality impacts and methane gas emissions from the strata to the atmosphere.

One of the key stakeholder themes identified in the consultation program was the need for 'sensitive mine planning', particularly in relation to mining under rivers and other natural features in sensitive areas.

INTEGRATING ENVIRONMENTAL ASSESSMENTS INTO MINE PLANNING

In the past, mine planning has considered potential effects on engineered structures, however, the same attention has not been paid to the effects of mining on natural features. Through the Stakeholder Involvement Programme conducted by Illawarra Coal, it was identified that government and community stakeholders were seeking a more sensitive approach be taken to mine planning in significant and high risks areas. As a result, mine planning processes are being reviewed to take into account the effects of mining on surface features.

The development and implementation of a new IMP was identified as a key strategy to address stakeholder concerns such as mining under rivers, and has been developed as a planning process to identify and manage subsidence effects on natural and constructed surface features.

The IMPP provides a systematic and ongoing approach to incorporating environmental assessments as part of mine planning. It is an iterative process enabling key events and business challenges to be identified and dealt with in a timely and systematic manner. A primary input into the process is the BHP Billiton Charter and Health Safety Environment and Community (HSEC) Policies. The business principles developed in these documents cascade through the Carbon Steel Materials planning strategy and into the Illawarra Coal business plan.

The Illawarra Coal planning cycle shown in Figure 2 supports and optimises the business plan. There are a number of inputs into the process, which is iterative and normally spans a period of 12 months or more.

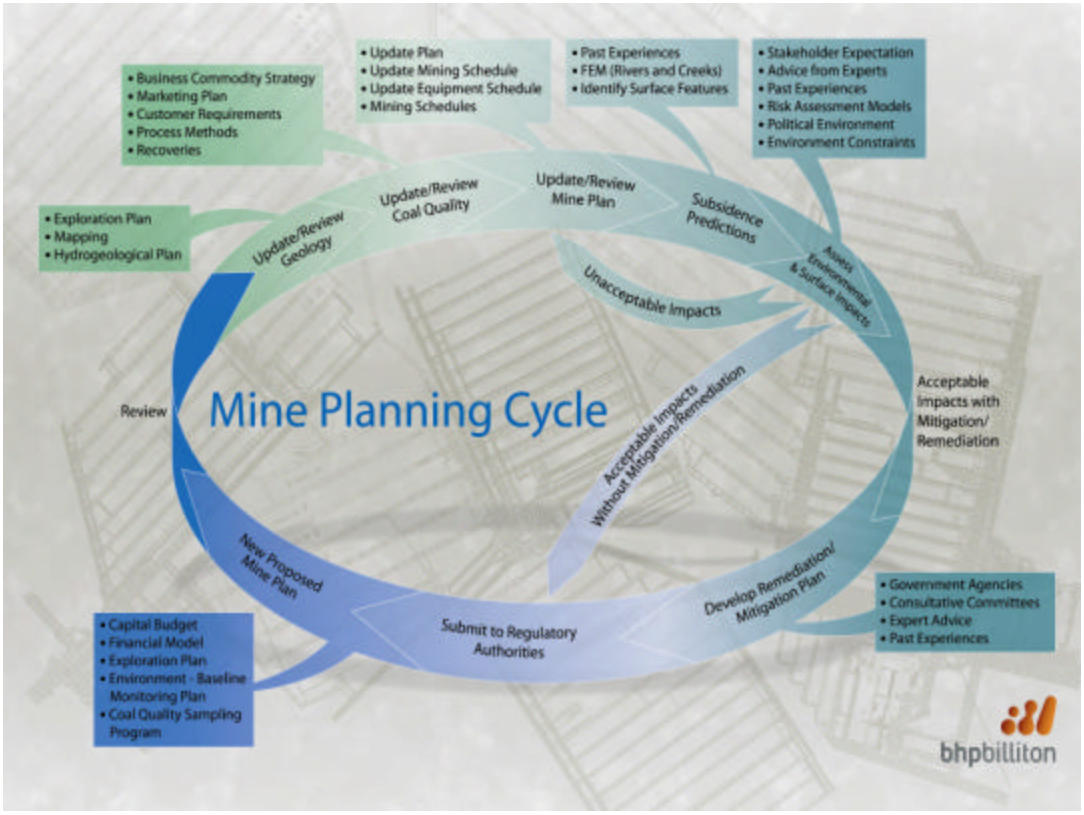

Fig 2 - Illawarra Coal Mine Planning Cycle

Impacts on natural features are addressed in the planning cycle through its assessment of environmental and surface effects. The key elements of the planning cycle include:

- continuing stakeholder consultation and participation;
- comprehensive baseline environmental assessment;
- consideration of environmental impacts and mitigation measures during the assessment of alternativee min e plan options;
- consideration of monitoring results from past mining activities; and
- monitoring and stakeholder reporting programs.

In order to build an approach with the ownership of both internal and external stakeholders, the development of the IMPP process has involved both internal and external consultation. The process followed for the development of the IMPP is illustrated in Figure 3.

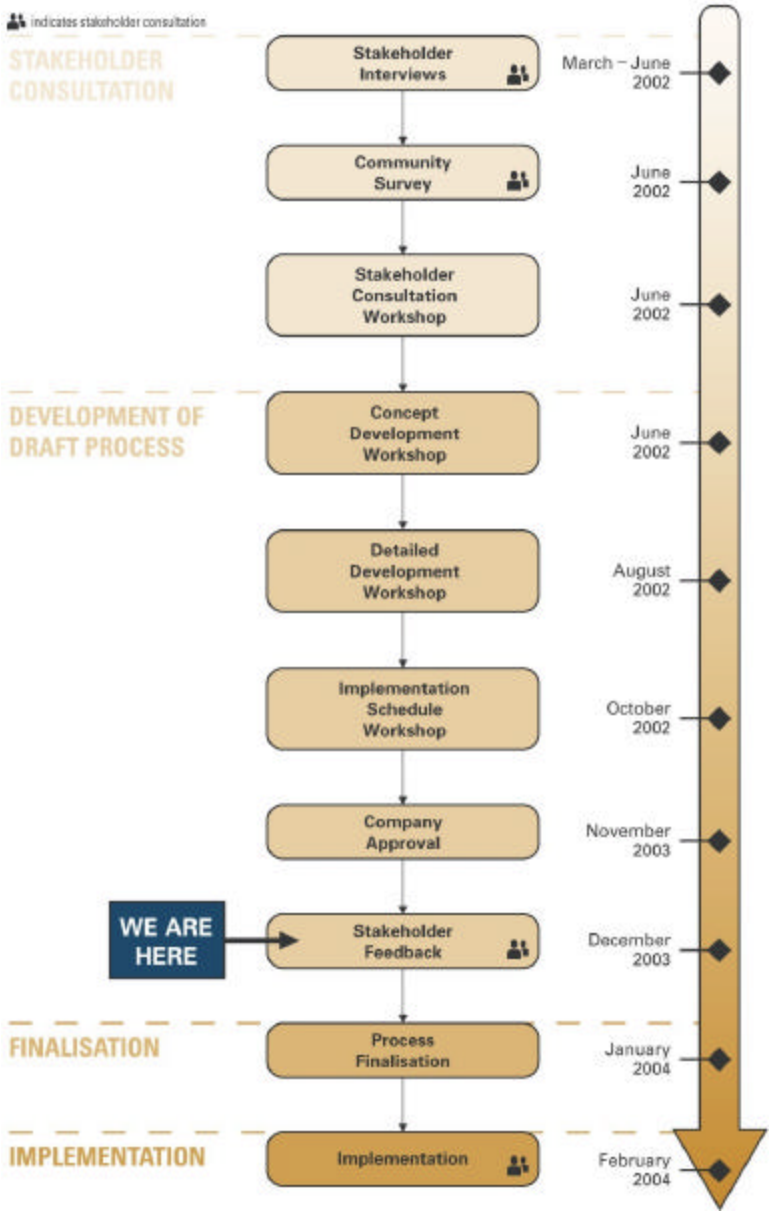

Fig 3 - Process for development of IMPP

The external community and government consultation phase conducted in 2002 was followed by a series of company workshops and meetings. From this, a draft, integrated mine planning process was developed with key planning and operations personnel. Development of the process then involved company approval and internal communication to the broader planning and operations staff within Illawarra Coal. Consultation is now underway with external stakeholders, including government, environmental groups, and community groups. The IMPP will then be finalised taking into account stakeholder feedback, and then implemented at Illawarra Coal mining operations.

The Illawarra Coal mine planning process is being developed to be consistent with the Department of Mineral Resources (DMR) SMP process. The SMP will replace the environmental assessment and approval components of the current approval process. The new DMR process will be implemented from March 2004.

TIMING OF MINE PLANNING

Mining of coal by longwall methods involves considerable expenditure and lead time (up to 5 years) for the development of access roadways before longwall coal extraction can commence. The cost of longwall development is high and needs to be done well in advance of mining to ensure continuity of extraction. This continuity is critical to the success of a longwall mining business. Without continuity, lost production, cost-impacts, loss of jobs and closure of mines would result. This reinforces the need for suitable long-term planning to ensure that timing requirements can be met. The IMPP process considers these factors.

Overview of the IMPP

The IMPP involves a holistic approach to the development of mine plans for the total minable resource area, rather than simply a plan for a set of mining panels associated with the next longwall mining approval. This approach ensures a greater level of awareness of issues, an ability to plan and implement mitigating strategies, and minimises business risk to the company associated with potential changes to mine plans.

The IMPP is designed to integrate stakeholder engagement and environmental impact assessment into the mine planning process. This will enable future mine plans to be developed on the balanced consideration of all relevant factors including stakeholder expectations, environmental impact, geology, resource utilisation, operational constraints and economic feasibility.

For the purpose of sensitivity assessment, surface features are grouped into three categories being natural features, infrastructure and private properties. The natural features that tend to be most sensitive to mining induced subsidence include rivers, creeks, wetlands or swamps, and cliff lines.

STEPS IN THE PROCESS

The process of developing the IMPP involves five yseps which are illustrated in Figure 4 and are discussed in detail.

Step 1 - Preliminary Sensitivity Assessment

Step 1 is the initial assessment of options for mine planning. It includes a review of geological information, mine layout, development requirements and access to the coal resource.

It also includes the preliminary assessment of the sensitivity of the surface features to underground mining. Illawarra Coal has a substantial database of information in relation to surface features, subsidence impacts, mitigation measures, and stakeholder expectations. The preliminary sensitivity assessment is designed to provide an initial focus for mine planning based on existing information. This enables the consideration of alternative mine planning options and/or mitigation measures at an early stage.

Step 2 - Preliminary Mine Planning Assessment

This step involves the preliminary evaluation of alternative mine plans to determine the preferred mine plan/s. The alternative mine plans are developed utilising proven mitigation or remediation of subsidence impacts on sensitive features and/or avoidance of sensitive surface features identified in Step 1.

The evaluation of alternatives is conducted by a multi-disciplinary mine planning team and involves a balanced consideration of economic, environmental and social issues. The multi-disciplinary team includes representatives from a number of internal groups including exploration, mine planning, mine infrastructure, environment, and community. The preferred mine plan or plans provide an initial focus for the detailed sensitivity assessment of surface features conducted in Step 3.

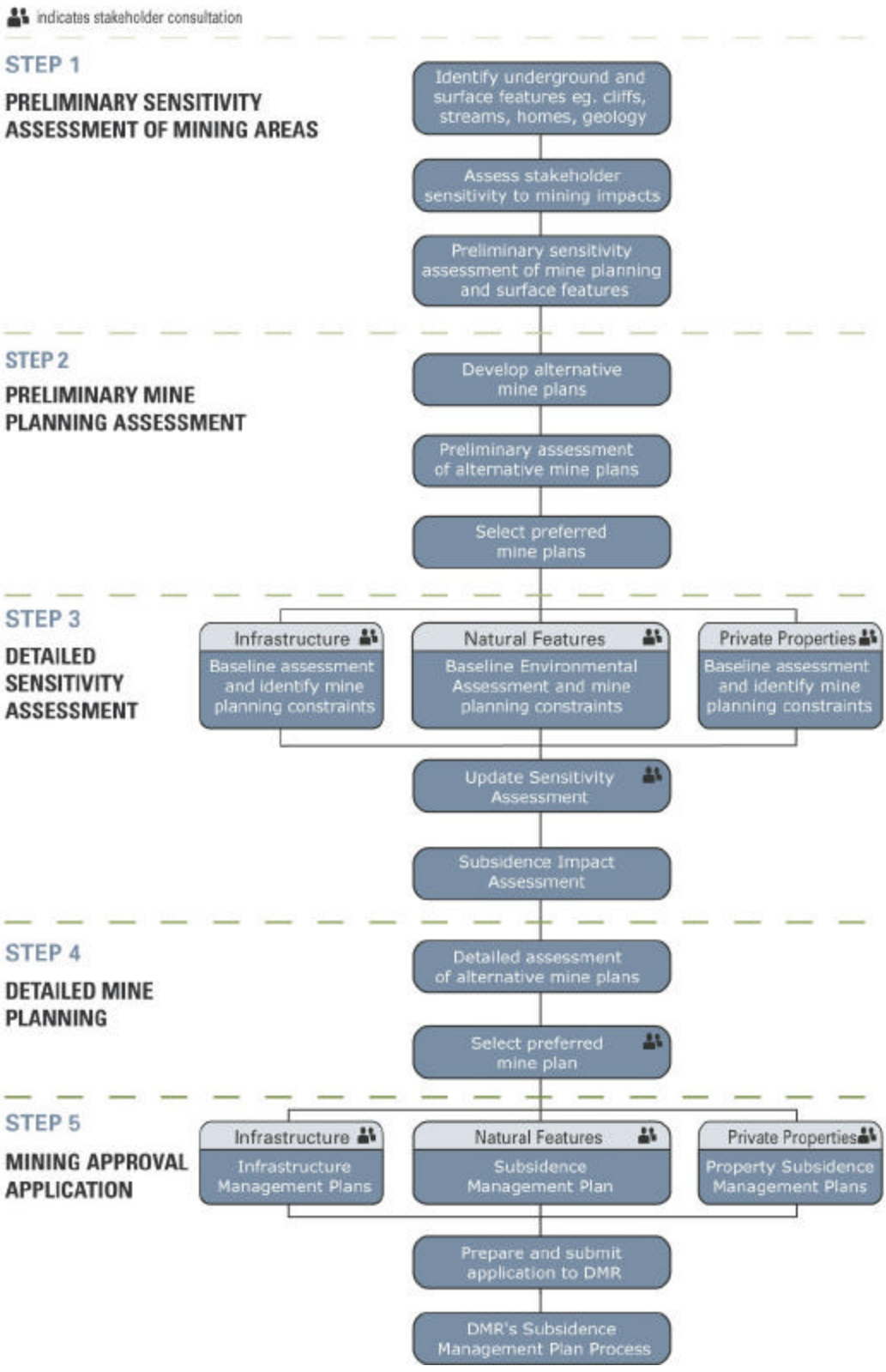

Fig 4 - Steps of the Integrated Mine Planning Process

Step 3 - Detailed Sensitivity Assessment

Step 3 involves a detailed sensitivity assessment of surface features, and mining constraints. It includes the collection of baseline data on surface features, subsidence impacts and mitigation measures, and seeks to identify mine planning constraints.

At this stage, the baseline assessment is undertaken in consultation with relevant stakeholders, leading to the revision of the sensitivity assessment from Step 1. These stakeholders include government, environmental groups, and community representatives. A subsidence impact assessment will be undertaken for natural features that will potentially be undermined, and mitigation options will be identified for significant features. Ongoing monitoring and assessment requirements will also be identified during this step.

Step 4 - Detailed Mine Planning

This step involves a detailed re-evaluation of alternative mine plans based on the results of Step 3. This review is conducted by the multidisciplinary mine planning team, in a similar process to Step 2, and involves a balanced consideration of economic, environmental and social issues. Step 4 results in the selection of a final preferred mine plan and development of preferred mitigation measures.

Step 5 - Preparation of the Mining Approval Application

This step involves the preparation of an SMP to support the subsequent longwall mining approval application. The SMP will include the impact assessments and proposed mitigation measures for natural features prepared in consultation with relevant government and community stakeholders. Step 5 will be repeated for each longwall mining application required over the life of the mining operation.

The DMR's processing of the SMP involves additional community consultations including public advertisements and access to the SMP.

HOW THE PROCESSING IS BEING IMPLEMENTED

Illawarra Coal has developed centralised mine planning teams incorporating expertise from the relevant mine, and representatives from exploration, environment, community, and long term mine planning areas to implement the integrated mine planning process. The objective of these teams is to ensure consistency of approach with the IMPP across the company's operations and to manage the development of the mine plan and the approval requirements. The teams are currently implementing the process for the development of new mining areas at both Appin and West Cliff mines.

CONCLUSION

The future of mining in the Illawarra region will be dependent on adequately addressing sustainability issues. This paper has shown BHP Billiton-Illawarra Coal's approach to incorporating environmental aspects into mine planning.

This has involved internal workshops and projects, together with external consultation. The paper describes the process that the company is utilising to fully incorporate environmental assessments into the mine planning process.

The purpose of this process is to identify sensitive surface features, mitigation and remediation options, and potential avoidance measures early in the mine planning process. Another key aspect of the process is to incorporate internal and external stakeholder feedback as part of the mine planning process.

The IMPP now being utilised within Illawarra Coal business is the process that has been developed to incorporate environmental assessments into mine planning.

It is anticipated this will lead to more secure outcome for the business. This is expected to occur through understanding and addressing environmental issues and incorporating stakeholder feedback early in the mine planning process, therefore minimizing the risk of changes to mine plans being required within short time

frames. The thorough and rigorous process will give the business confidence that the mine plan submitted through the SMP application to government has the highest probability of approval. We are confident that this process will provide the most sustainable outcome – for the environment, community, and the business.

ACKNOWLEDGEMENTS

Managers, exploration staff, mine planners and other representatives from the Illawarra Coal business are acknowledged for their contribution and willingness to embrace the significant change that is occurring to fully incorporate environmental assessments as part of our mine planning processes.

There has been considerable input from Coakes Consulting into the development of this process, including facilitation of the stakeholder involvement programme, facilitation of workshops, contribution of ideas towards modifying our mine planning processes, and documentation, much of which has been utilised in the preparation of this paper.

The role of internal managers and the expertise that Coakes Consulting have brought have both been crucial to the success of the IMPP within Illawarra Coal.