

3. MINING SYSTEM AND RESOURCE RECOVERY

(SMP Guideline Section 6.1)

3.1. MINING METHOD

Longwalls 705 to 710 will be extracted using a longwall retreating system of mining, an established method of coal mining widely used in Australia and overseas. This method is described briefly below and in more detail in the subsidence report provided in **Appendix A**.

Coal is mined from the Bulli Seam using a longwall system supported by continuous miner development units. The longwall is a complex system of mining equipment that incorporates roof support, coal cutting and coal transport equipment to provide a safe working environment.

During the preparation stages of a longwall operation, the roadways are developed to delineate proposed longwall blocks. These roadways define the boundaries of the longwall block and are required to provide employee access, ventilation, coal transport and other services. Roadways are nominally driven 4.8 metres wide and full seam height. The value of coal extracted when roadways are being driven does not meet the high mining costs of driving the roadways in the Southern Coalfield. The economic returns from investing in roadway development come from the subsequent longwall extraction, which require the previously developed roadways.

Longwall mining involves extracting a block of coal with a longwall shearer, which travels back and forth across the coalface, totally removing the coal between the developed roadways. This machinery cuts the coal from the coalface on each pass and a face conveyor, running along the full length of the coalface, carries this away to discharge onto a belt conveyor. The belt conveyor carries the coal out of the mine.

The coalface is supported by a series of hydraulic roof supports. The supports temporarily hold up the roof strata and enable enough space for the shearer and face conveyor. After each slice of coal is removed, the face conveyor, hydraulic roof supports and the shearer are moved forward. When coal is extracted using this method, the roof immediately above the seam collapses, behind the supports into the void (goaf) that is left as the face retreats. This method of mining relies on the material goafing as the longwall retreats. If this roof material does not collapse the longwall equipment is unable to hold the increasing weight of the material above the coal seam. As the roof material collapses into the goaf behind the roof supports, the fracturing and settlement of the rocks progresses through the overlying strata and results in sagging and bending of the near surface rocks and subsidence of the ground above. The subsidence effect moves across the ground at approximately the same speed as the mining face, which is typically 50 to 60 metres per week.

The coal is transported to the surface at Appin Colliery via conveyors and transported by road to the West Cliff Washery where the raw coal is processed. The clean coal is then delivered to the Port Kembla steelworks or Port Kembla Coal Terminal by truck. No additional surface facilities or activities are required as part of this proposal.

The majority of underground coal producers in Australia use longwall extraction coal mining methods to achieve production requirements. The high cost of mining necessitates that coal mines produce in excess of 3.0 Mtpa or 15,000 tonne per man output to be competitive. Major impacts on the mine planning process include the geology, mining conditions encountered and in-seam and strata gas regime. These all dictate the rate of roadway development and the

layout of longwall blocks. Due to the high cost of roadway development, and the speed of retreat of a longwall face to produce more than 3.0 Mtpa, longwall face widths and lengths are increasing in order to achieve high longwall retreat to roadway development ratios. Wider longwall blocks provide the best resource recovery possible while maintaining longwall continuity between blocks.

3.2. MINING GEOMETRY

The proposed layout of Longwalls 705 to 710 within the Bulli Seam is shown in **Figure 2.1** and **Plan 1**. A summary of the proposed dimensions of these longwalls is provided in **Table 3.1**.

Table 3.1 - Proposed Dimensions of Longwalls 705 to 710

Longwall	Overall Length (m)	Void Width Including Headings (m)	Solid Chain Pillar Width (m)
Longwall 705	3325	325	45
Longwall 706	3550	325	45
Longwall 707	3740	325	45
Longwall 708	3900	325	45
Longwall 709	4305	325	45
Longwall 710	5065	325	45

The depth of cover to the Bulli Seam within the general SMP Area varies between a minimum of 440 m, in the base of the Nepean River valley, and a maximum of 620 m, near the western end of Longwall 708. The depth of cover directly above the proposed longwalls varies between 470 m, at the eastern end of Longwall 707, and 620 m, near the western end of Longwall 708. The seam floor within the general SMP Area generally dips from the south-east to the north-west.

For figures of surface level contours, depth of cover contours, seam thickness contours and seam floor contours, refer **Plan 2, 3A, 3B** and **3C** or **Appendix A**.

3.3. SEAM TO BE MINED

Coal in Longwalls 705 to 710 is to be extracted from the Bulli Seam, of the Illawarra Coal measures, (refer **Plan 6**) located approximately 470 to 540 metres underground. The seam floor generally dips from east to west. The seam thickness within the proposed longwall goaf areas varies between a minimum of 2.8 m, near the eastern end of Longwall 708, and a maximum of 3.5 m, near the eastern ends of Longwalls 709 and 710. The proposed longwalls will extract the full seam height.

For figures of seam floor contours and seam thickness contours refer **Plan 3B** and **3C** or **Appendix A**.

3.4. SCHEDULE OF PROPOSED MINING

First workings for Longwalls 705 to 710 are planned to commence in 2010. Longwall extraction is planned to commence in August 2011 and be completed by mid April 2021. Development and longwall mining schedules are subject to continual revision based on changing mining conditions and timing could vary considerably. Ongoing discussions with key stakeholders, including the DPIM, will ensure that any changes to the mining schedule are communicated to key stakeholders as soon as possible.

A summary of the mining schedule for the proposed Longwalls 705 to 710 as described in this application is presented in **Table 3.2**.

Table 3.2 - Mining Schedule

Longwall	Scheduled Start	Scheduled Finish
Longwall 705	31/8/2011	18/12/2012
Longwall 706	14/1/2013	3/6/2014
Longwall 707	30/6/2014	14/12/2015
Longwall 708	10/1/2016	15/7/2017
Longwall 709	11/8/2017	10/4/2019
Longwall 710	7/5/2019	12/4/2021

Mine layouts for Appin Area 7 have been developed using Illawarra Coal's Integrated Mine Planning Process (IMPP). This process considers site specific mining and surface impact issues when designing mine layouts. It is an iterative process where mine layouts are modified to take into account additional surface and underground information as it is obtained during the planning and approval process. As a result of the IMPP, Illawarra Coal currently has no mine layouts planned to directly longwall mine beneath rivers.

Illawarra Coal recognises the importance of working closely with Government and communities to address stakeholder issues in the planning and management of mining activities. In response to the issues raised from the community and Government, Illawarra Coal assessed alternative mine layouts which reduce impacts to the Nepean River from mining subsidence. The development and implementation of an IMPP was identified as a key strategy to address stakeholder issues such as mining under rivers. In order to build an approach with the ownership of all stakeholders, the development of the IMPP has involved both internal and external consultation. This process was developed in consultation with DPIM and is consistent with the requirements of the DPIM Subsidence Management Plan approvals process. Each of the mining layout options was assessed against the following key criteria:

- Extent, duration and nature of the impact to surface features
- Community, social and environmental impacts
- Coal customer requirements
- Roadway development and longwall continuity
- Mine services such as ventilation
- Recovery of the resource for the business and the State
- Gas drainage, geological and geotechnical issues

- Previous experience gained in mining in the adjacent areas and the results of that mining coupled with the results of the monitoring and mitigatory measures where applicable.

3.5. BENEFITS OF THE PROPOSED DEVELOPMENT

The extraction of underground coal reserves from Longwalls 705 to 710 is necessary to ensure continuity of coal supply to customers and achieve business objectives for Illawarra Coal. At the same time, it provides financial benefits at international, national, state and local levels.

About 60% of the high quality coal produced is blended with Wongawilli Seam coal to supply a specific coal product to the BlueScope and OneSteel Steelworks. The remainder is exported to overseas steel makers. The proposed extraction of coal from Longwalls 705 to 710 represents a continuing significant operating investment in the Southern Coalfield of New South Wales. Continuing benefits occur through continuity of employment, expendable income, export earnings and government revenue.

In 2006-07, Illawarra Coal had 986 permanent employees, with a total payroll of \$175.9 million (excludes contractor payroll costs), up 3.3 per cent from \$170.2 million the previous year. Illawarra Coal has a significant commitment to sourcing its goods, materials and services from the Illawarra and Wollondilly regions. In 2006-07, Illawarra Coal spent \$265 million on regional suppliers and, overall, New South Wales suppliers accounted for 44.84 per cent (or \$591 million) of our total goods, materials and services spend in Australia. Illawarra Coals total spend increased slightly from \$588 million to \$591 million. Illawarra Coal spent almost \$13 million on environmental initiatives in 2006-07, including research and development, site rehabilitation and environmental monitoring.

In 2006-07, Illawarra Coal contributed \$86.4 million to local, state and federal government taxes, a significant reduction from \$161.4 million in 2005-06. The reduction can be attributed to decreases in company tax (lower profits), partly offset by increases in NSW royalties (increased revenue) and NSW payroll tax (higher payments to employees).

3.6. IMPACT ON RESOURCE RECOVERY

The consequences of not mining Longwalls 705 to 710 include loss of coal production from the colliery and potential closure of Illawarra Coal operations. Losses from a major supply of Bulli Seam coal from the Illawarra Coal operations has the potential to severely disrupt or prevent the production of the Illawarra Coal blend, which is the basis of Illawarra Coal customer requirements. Illawarra Coal provides 90% of the coal for the Australian Steel Industry.

From experience with the Bulli Seam in the Appin Mine, the mining method to be used for Longwalls 705 to 710 has been shown to ensure safety of personnel, operating the equipment, economic viability, acceptable environmental impact and maximum resource recovery.

The two other seams in the area, namely the Balgownie and the Wongawilli Seams are considered to be non-economic at this time, see **Plan 6**. These seams are not necessarily sterilized by this development.

3.7. ESTIMATED RECOVERY

Longwalls 705 to 710 contain approximately 47.2 million tonnes of coal. Total recovery is estimated to be 34.6 million tonnes of coal with 32.4 million tonnes recovered from the longwalls and 2.2 million tonnes recoverable from roadway development totalling 73% resource recovery.

3.8. POSSIBLE EFFECTS ON OTHER SEAMS

The Bulli Seam is the top seam in the Illawarra Coal Measures and consequently, mining this seam does not preclude future extraction of the seams below. There are currently no workings in other seams in the area.

There are five coal seams below the Bulli Seam ranging in thickness from 0.8 to 9.0 metres. The adjacent Balgownie seam is from 5.0 to 10.0 metres below the Bulli seam, but is only approximately 1.2 metres thick and is not considered economically viable to mine. The mining of Longwalls 705 to 710 will not preclude the future mining of the lower seams (see **Plan 6**).

3.9. FURTHER PLANS FOR MINING OTHER SEAMS

Using available technology the Bulli Seam is currently the only economic seam in the area and there are no existing plans for mining other seams in the future.