

Subsidence Management Plan



**Ashton Coal
Longwall Panels 1 - 4**

Subsidence Management Plan
Written Report

Table K.1 Conditions of Consent (Relating to Subsidence)

No.	Condition	Comment
Subsidence Management - General		
3.9	The Applicant shall design underground mining operations to ensure no direct hydraulic connection between the Bowmans Creek alluvium and the underground workings can occur through subsidence cracking. In order to achieve this criteria the Applicant shall assess levels of uncertainty in all subsidence predictions, and provide adequate contingency in underground mine design to ensure sufficient sound rock is maintained to provide an aquaclude between the Bowmans Creek alluvium, and the underground mine goaf.	This SMP application for longwalls 1 to 4 is outside the Bowmans Creek saturated alluvium. This issue is discussed further in the Groundwater Assessment by Dundon (2006) (Section 5.5 in <i>Annex D</i>). Subsidence predictions and levels of uncertainty are provided in the report by SCT (refer to <i>Annex I</i>).
3.10	The Applicant shall make every reasonable effort to ensure that any member of the public entering an area affected by subsidence in the mining area is made aware of any danger caused by the surface subsidence, including impacts on roads.	There is only one point of entry to the site from a public road. Signage will be erected near the entry of the site - in accordance with Section 5.1 of the Public Safety Subsidence Management Plan. Other gates (ie. from the Travelling Stock Reserve) will be locked.
3.11	The Applicant shall monitor and remediate any mine subsidence related impact including cracking, slumping, and erosion and provide stabilising structures in any areas that have significant risk of de-stabilisation occurring as a result of longwall panel mining, in accordance with DIPNR guidelines, to the satisfaction of DIPNR and in consultation with DEC and DPI - Fisheries.	The stability of slopes within the Application Area has been assessed by Parsons Brinkerhoff (<i>Annex B</i>) and the need for stabilisation works was not required. Subsidence monitoring, as recommended by SCT (Section 7 of <i>Annex I</i>) has been incorporated into the SMP. Monitoring of surface cracking and erosion will be undertaken on a weekly basis in accordance with the Mining Operations Plan, and as documented in the Land SMP.
3.12	The Applicant shall maintain an access road from the New England Highway to property No. 130 (refer EIS Volume 3, Figure 3.13). Any realignment of the existing access road shall be designed and constructed by the Applicant in consultation with the owner of property No. 130, Council, DPI - Minerals, the local Aboriginal community, and DEC, and to the satisfaction of the Director-General. The Applicant shall submit design and plans for any realignment to the Director-General for approval one month prior to commencement of construction of the realignment. The Applicant shall have prepared and registered by the Land Titles Office a right of way over any realignment of the access road in favour of the landowner of property No. 130. The Applicant shall be responsible for rehabilitation and revegetation of any disused sections of the access road after realignment.	This issue has been addressed in the Subsidence Management Plan. In consultation with the landowner, no realignment is proposed, however daily management of the condition of the road and consultation with the landowner aims to ensure safe uninterrupted access to Property No. 130.

No.	Condition	Comment
3.13	At least nine (9) months prior to the extraction of coal from Longwall Panel 1, as defined in the EIS, by longwall mining or other mining methods requiring approval under Section 138 of the Coal Mines Regulation Act 1982, the Applicant shall advise the landowner of property No. 130 of the Applicant's plans for future mining activities and the specific impacts (based on best available information) affecting each property.	The RTA and landowner of Property No. 130 has been consulted by ERM and ACOL as part of the stakeholder consultation process (refer to <i>Section 8.2.2.</i>) for the SMP. This included discussion of the proposal and predicted impacts, as well as appropriate management actions.
3.14	At least one month prior to the commencement of the following activities, the Applicant shall notify the owner of property No. 130 (refer EIS Volume 3, Figure 3.13) in writing of the proposed activity and any potential impacts due to that activity: <ul style="list-style-type: none"> a) construction of development headings (first workings) under the property; b) lodgment of an application in accordance with Section 138 of the <i>Coal Mine Regulation Act, 1982</i> to longwall mine (secondary workings) under the property. 	The landowner of Property No. 130 has been consulted by ERM in May as part of the stakeholder consultation process. Refer to <i>Section 8.2.2.</i> The landowner was notified approximately 5 to 6 weeks prior to the construction of development headings beneath Property No. 130. Copies of the correspondence are provided in <i>Annex J.</i>
3.15	The Applicant shall monitor the condition of watercourses above longwall panels in the mining area, during mining and continue monitoring until completion of post mining rehabilitation to the satisfaction of DPI - Fisheries, to identify any impacts on aquatic habitats or fish passage, and implement appropriate actions if and when adverse impacts occur.	A pre-mining assessment of Bowmans Creek is complete, including survey of ponds etc (refer to <i>Annex B.</i>) Two rounds of aquatic monitoring also complete (refer to <i>Annex F.</i>)
3.16	No tunnelling or mining shall occur directly underneath the piers or abutments of Bowmans Creek Bridge. The RTA must approve access tunnel layouts in the vicinity of the Bridge.	No tunnelling or mining directly underneath the Bowmans Creek Bridge is proposed as part of this SMP. The RTA has been consulted during the SMP process and has been provided a copy of the Subsidence Assessment by SCT (<i>Annex H.</i>)
3.17	The angle of draw for the mine subsidence after removal of the coal is to be kept outside of the New England Highway Road Reserve.	The angle of draw from each panel is outside the New England Highway Road Reserve.
Subsidence Environmental Management Plan		
3.18	The Applicant shall prepare and implement a Subsidence Environmental Management Plan (SEMP) to detail an environmental management framework, practices and procedures to be followed during longwall mining activity at the mine. This Plan shall include, but not necessarily be limited to: <ul style="list-style-type: none"> a) demonstration of consistency with commitments made in documents listed in condition 1.2 and compliance with the conditions of this consent; 	DoP have agreed to integrate the SEMP and SMP process (refer to <i>Section 9.1.3.</i>) This table demonstrates compliance with the conditions of consent.

No.	Condition	Comment
b)	detailed description of the proposed underground mining operations, the existing surface and underground environment, and predicted subsidence impacts on the following: <ol style="list-style-type: none"> i. surface topography; ii. geological integrity; iii. surface water hydrology and erosion; iv. groundwater systems; v. Aboriginal cultural heritage; vi. terrestrial and aquatic ecosystems; vii. land capability and agricultural suitability; and viii. any surface improvements, including roads, dams, transmission lines, pipelines, cables, fences, water gauging stations, and buildings 	Descriptions of the existing surface and underground environments can be found in the <i>Section 6</i> of this Written Report. Subsidence predictions and impacts are discussed in <i>Section 7</i> and <i>Section 10</i> of this Written Report.
c)	a detailed remediation strategy to remediate potential impacts identified in sub clause b;	Remediation strategies for the subsidence impacts to surface and subsurface features identified and are summarised in the SMP and detailed in the relevant specific SMPs.
d)	consideration of the cumulative impacts of subsidence due to multiple seam extraction;	Refer to <i>Section 10.10</i> of this Written Report.
e)	identification of all statutory and other obligations that the Applicant is required to fulfill in relation to management of subsidence, including all consents, licenses, approvals and consultations;	Statutory requirements are discussed in <i>Section 9</i> of this Written Report and this <i>Annex</i> .
f)	a description of the roles and responsibilities for all relevant employees involved in the management of subsidence;	These are summarised in the SMP with more detailed descriptions provided in the specific SMPs.
g)	environmental policies and principles to be applied to the management of subsidence;	Relevant policies and principles are addressed where appropriate in the supporting documents.
h)	standards and performance measures to be applied to subsidence management, and a means by which environmental performance can be periodically reviewed and improved;	Each specific SMP includes objectives and performance criteria for the management of subsidence as well as an audit and review process to be implemented at the completion of each panel.
i)	management practices and procedures to ensure that environmental performance goals are met and to comply with the conditions of this consent;	Specific subsidence management plans have been prepared and are submitted with the application in compliance with this condition of consent and the SMP guidelines (DMR, 2003).

No.	Condition	Comment
j)	detail actions to be taken in the event of an emergency leading to adverse environmental impacts;	Emergency responses for potential emergency events are provided in the specific SMPs.
k)	<p>a remediation strategy to address any identified damage to Bowmans Creek occurring through mining-induced subsidence. Any remediation strategy would involve works that would require approvals to be granted by DIPNR for implementation, and therefore must be submitted to DIPNR for approval. The remediation strategy is to include the following provisions:</p> <ul style="list-style-type: none"> i. Identification of approval requirements for implementation of any works required ii. Reporting of options to address degradation or obstruction to fish passage through the affected reach iii. Vegetation re-establishment in affected areas of the creek banks, breakout points and submerged areas of the creek iv. Locations for installation of any artificial bed controls which may be required to arrest actual or potential erosion along the affected reach v. Timeframes to achieve remediation of each zone of degradation in the channel and sign off point for the entire affected corridor of creek affected by mining-induced subsidence vi. Identification of Aboriginal heritage values and measures to minimize impacts on these values vii. rehabilitation works, particularly re-snagging in consultation with DPI - Fisheries and the Upper Hunter River Rehabilitation Initiative (managed by Macquarie University and DIPNR) viii. provision of compensatory habitat for subsidence impacts 	Bowmans Creek will not be impacted by mining subsidence of longwall panels 1 to 4 in the Pikes Gully Seam. This condition will apply to future workings and will be dependent on the results of ongoing monitoring. The pre-mining assessment in accordance with Condition 3.20 is provided as <i>Annex C</i> to this report.
l)	provision for forwarding the position of weekly workings to the RTA when underground mining occurs within 200 metres of the New England Highway road reserve;	ACOL have been notifying the RTA in compliance with this condition and the notification process has been included in the specific Access Roads SMP.
m)	specific consideration of measures to address any requirements of DEC, DIPNR, DPI - Fisheries, DPI - Minerals, MSB, DPI - Agriculture, RTA, and the Council ;	No specific requirements were advised during the consultation process. Relevant policies and guidelines of these organisations have been addressed.

No.	Condition	Comment
	n) results of consultation with the CCC, the local Aboriginal community, and affected landholders;	<i>Section 8</i> of this Written Report outlines the consultation undertaken for the preparation of the SMP with relevant stakeholders. Records of the consultation (ie correspondence, minutes, presentations) are provided in <i>Annex J</i> .
	o) the environmental monitoring requirements outlined under conditions 3.19-3.22 of this consent.	Many of the monitoring requirements under conditions 3.19-3.22 are described in existing ACOL management plans. Those that aren't are outlined in the SMP.
3.19	The Applicant shall undertake a detailed and ongoing monitoring program of subsidence resulting from mining to the satisfaction of the Director-General and the DPI - Minerals and in consultation with DIPNR, DEC, DPI - Fisheries and according to the recommendations of any independent expert review [refer to Conditions 8.3- 8.7]. The monitoring program shall extend from commencement of construction throughout the life of the mine and for a period of at least five years after the completion of mining, or other such period as determined by the Director-General in consultation with DIPNR, DEC, DPI - Fisheries and DPI - Minerals. Monitoring shall be supported by visual as well as technical records. Monitoring shall include, but not be limited to, the following:	These monitoring requirements have been accounted for in the preparation of environmental management plans and subsidence management plans for the site.
	a) monitoring of all relevant subsidence parameters including vertical subsidence and ground strain;	Subsidence monitoring is outlined in <i>Annex I</i> and in the SMP.
	b) results of detailed inspections of underground workings and coal seams noting any changes in roof or floor conditions, or any water inflows which may indicate the presence of geological features such as faults, dykes or joints;	These monitoring requirements are documented in the Groundwater Management Plan (ACOL, 2003).
	c) records of surface geological mapping or subsurface investigation which may indicate the presence of geological structures, and assessment of any possible correlation between surface features and features in underground workings at seam level;	Geological logs and reports are provided as <i>Annex B</i> .

No.	Condition	Comment
d)	monitoring of the propagation and extent of subsidence-induced cracking including: <ol style="list-style-type: none"> <li data-bbox="405 469 1144 493">i. plotting exact location, depth, and characteristics of surface cracks <li data-bbox="405 501 1234 560">ii. monitoring the extent of cracking connecting surface cracks to the collapsed goaf area 	Refer to the Land SMP and Groundwater Management Plan (ACOL, 2003). These are both attached to the SMP. It should be noted that the Groundwater Management Plan is currently being updated in response to the Groundwater Assessment and that this will be finalized in consultation with DNR. Actions to be incorporated into the management plan will include vibrating wire piezometers to monitor aquifer effects of interconnected surface - goaf cracking.
e)	regular monitoring of all water inflows to the underground mine including location and flowrate of inflows. Water quality analysis should be conducted if a significant change in water flow or discolouration is observed at any time to identify the possible source of the water;	Monitoring requirement is documented in the Groundwater Management Plan (ACOL, 2003).
f)	monitoring of groundwater levels and quality;	Monitoring requirement is documented in the Groundwater Management Plan (ACOL, 2003). Some existing data is provided in the groundwater assessment by Dundon (2006) as provided in <i>Annex D</i> .
g)	a survey of affected stream channel systems, including monitoring of rainfall, surface water flows, water ponding, and water quality;	Refer to condition 3.20.
h)	monitoring of Bowmans Creek as required by condition 3.20;	Refer to condition 3.20.
i)	monitoring of changes to surface water run-off and erosion;	Monitoring of erosion is included in the Site Water Management Plan (ACOL, 2006) and specific Land SMP. These are both attached to the SMP.
j)	monitoring of cultural heritage sites;	No cultural heritage sites are known to exist within the site.
k)	monitoring of impacts to agricultural land;	Monitoring of agricultural land is provided in the specific Land SMP, as well as the Land Management Plan (ACOL, 2005c).
l)	monitoring of impact of subsidence on existing vegetation and terrestrial and aquatic ecosystems;	Pre-mining and baseline assessments have been conducted and are annexed to this report (<i>Annexes F, G and H</i>) to enable the future determination of impacts due to subsidence.
m)	monitoring and evaluation of subsidence management and remediation techniques identified in the SEMP;	Each specific SMP allows for an audit and review at the completion of each longwall panel to evaluate and improve subsidence management and remediation techniques.
n)	a comparison of predicted subsidence impacts with actual impacts, and updating of predicted impacts for future longwalls and long-term impacts, particularly on groundwater systems and salinity.	Applicable to future SEMP/SMPs. The monitoring outlined in this SMP for longwalls 1 to 4 will enable confirmation of assumed parameters and enable greater certainty of predictions for future longwall panels.

No.	Condition	Comment
3.20	<p>The Applicant is to conduct a detailed Stream Monitoring Program on Bowmans Creek developed in consultation with DIPNR and DPI - Fisheries. This monitoring is to commence at commencement of construction, or as otherwise directed by the Director-General, and is to be supported with visual records as well as technical records. The River monitoring program shall include, but not be limited to:</p> <ul style="list-style-type: none"> a) a detailed benchmark survey of the affected length of Bowmans Creek, and the reaches from the nearest upstream bedrock control point from the effective zero point of subsidence to the nearest downstream control point from the effective zero point of subsidence (usually measured by the 20 mm limit of subsidence). This survey is to be completed at least one year prior to mining affecting the stream channel system, or as otherwise directed; b) pre-mining assessment including: <ul style="list-style-type: none"> i. identification of stable bedrock control points along the affected reach, and the nature and extent of bedrock control points. ii. identification of stable cross sectional survey control points along the affected reach iii. identification of chain pillar survey control points to establish the change in vertical reduced levels and bed gradient change iv. identification of stable control monitoring points to establish bedload transport through the affected reach v. assessment of the extent of existing pool-riffle sequences, rock bar and cobble chute pools and bed gradient steepening through riffle sequences vi. assessment of bank stability provision by existing vegetation galleries along the affected reach of Bowmans Creek vii. the extent, floristics and structure of any existing wetlands or standing pools along the length of the affected reach of Bowmans Creek viii. existing water quality and exchange/discharge rates of local groundwaters (both alluvial and underlying bedrock) to Bowmans Creek ix. monitoring to benchmark fish, macroinvertebrates and aquatic habitat; water velocities and flow rates; and current geomorphological design and stability of the creek. 	<p>A detailed benchmark survey by Pegasus has been completed and a premining assessment of Bowmans Creek (ERM) is included as <i>Annex C</i> to this Written Report.</p> <p>Survey completed.</p> <p>Results are provided in <i>Annex C</i> and <i>F</i>. With respect to item viii – refer to the groundwater assessment by Dundon (2002) in <i>Annex D</i>.</p>

No.	Condition	Comment
c)	<p>immediate post-mining monitoring (at least twice in the period within one year of each longwall pass under Bowmans Creek), including:</p> <ul style="list-style-type: none"> i. extent of change in level and gradient from each control point identified in the pre-mining survey. ii. extent of change in cross section between each survey control point identified in the pre-mining survey iii. change in pool-riffle sequence, depth and width of pools, location of breakout points for flood waters from the subsided troughs overlying each extracted longwall panel. iv. change in stream power relations through each chain pillar and chute/riffle sequence along the extent of the affected stream. v. obstruction to fish passage through reverse gradient slopes on the downstream face of each subsidence trough vi. cumulative changes in stream power and tractive stress along the affected reach. vii. impacts on existing vegetation communities along Bowmans Creek from subsidence or other impacts, and potential impacted areas from potential breakout points along the channel (such as the southern length of subsidence overlying longwall panels 5, 6 and 7 beyond the incised meander of Bowmans Creek) viii. monitoring to assess impacts to fish, fish passage, macroinvertebrates and aquatic habitat; water velocities and flow rates; and geomorphological design and stability of the creek 	Not yet applicable.

No.	Condition	Comment
d)	<p>long term monitoring on a bi-annual basis extending for at least five years after longwall mining has been completed under Bowmans Creek;</p> <ul style="list-style-type: none"> i. changes in bed gradients, control point locations, pool/riffle locations and chute depths and energies along the affected reach of the creek. ii. changes in bedload transport rates, bed material sorting/imbrication, bedrock control exposure and energy relations in the affected reach of the creek iii. drainage of local groundwaters into and water quality changes in each pool of Bowmans Creek, including an assessment of pool maintenance periods during dry periods resulting from discharge of local groundwaters into Bowmans Creek. iv. vegetation community changes along the length of the affected channel v. long term changes in biological communities within the affected reach of the creek vi. monitoring to assess impacts to fish, fish passage, macroinvertebrates and aquatic habitat; water velocities and flow rates; and geomorphological design and stability of the creek 	Bi-annual monitoring requirement is included in the Flora and Fauna Management Plan (ACOL, 2005b).
3.21	A detailed survey of the New England Highway road corridor is to be undertaken. Permanent monitoring stations must be installed as part of the initial survey. The initial survey is to be undertaken jointly with the RTA.	Survey marks for the first workings have been established in conjunction with the RTA and are currently monitored monthly. The extent of survey within the New England Highway corridor is to be expanded for this SMP and will be carried out jointly with the RTA.
3.22	Subsidence monitoring on the New England Highway is to be undertaken on a 3 monthly basis until the cessation of the mining process and pending ground movement.	This requirement is included in the Road Subsidence Management Plan
3.23	The Applicant shall report on monitoring conducted and provide a full interpretation results in the SMIAR (condition 3.24) and the AEMR.	Reporting requirements have been included in the SMP. As approved by the DoP the requirements shall now be completed as part of the SMP process.

No.	Condition	Comment
<i>Subsidence Monitoring and Impact Assessment Report</i>		
3.24	The Applicant shall prepare and implement a Subsidence Monitoring and Impact Assessment Report (SMIAR) for each longwall panel or group of panels for which an application for secondary workings approval under s.138 of the <i>Coal Mines Regulation Act 1982</i> will be sought. The report is to be submitted for approval to the Director-General, in consultation with and taking into account requirements of the Director-General of the DPI - Minerals, the DEC, DIPNR and DPI - Fisheries, at least one month prior to the submission of the s.138 application to the DPI - Minerals. The Director-General may require Independent Expert Review (conditions 8.3-8.7) of a SMIAR prior to approval. No application for secondary workings approval under s.138 of the <i>Coal Mines Regulation Act 1982</i> longwall panels proposed in the SMIAR shall be made until written approval is received from the Director-General.	The SMIAR will now form part of the next SMP application for longwall panels 5 to 8 (refer to <i>Section 9.1.3</i>). The preparation and submission of the next SMP application will occur upon the completion of longwall panel 3.
3.25	Subsidence Monitoring and Impact Assessment Reports shall be consistent with the conditions of this consent, the Environmental Management Strategy and relevant environmental management plans.	Not yet applicable. Relevant to the next SMP application for future longwall panels.
3.26	The Applicant shall not apply, under section 138 of the <i>Coal Mines Regulation Act 1982</i> , for any longwall panels involving mining that may impact the Bowmans Creek alluvium until at least three longwall panels in the Pikes Gully Seam have been completed (panels 1, 2, and 3 as described in document referenced in 1.2v) and the first SMIAR has been approved by the Director-General.	None of the proposed longwall panels (1 to 4) will impact on Bowmans Creek alluvium.

No.	Condition	Comment																																
3.27	<p>SMIARs and s138 applications are to be prepared and submitted in the following sequence:</p> <table border="1"> <thead> <tr> <th>SMIAR No</th> <th>To be submitted at completion of panel No</th> <th>Panel currently being extracted</th> <th>Panels in s138 Application</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>3</td> <td>4</td> <td>5, 6, 7 (PGS)</td> </tr> <tr> <td>2</td> <td>6</td> <td>7</td> <td>8, 9, 10, 11 (ULS)</td> </tr> <tr> <td>3</td> <td>10</td> <td>11</td> <td>12, 13, 14 (ULS)</td> </tr> <tr> <td>4</td> <td>13</td> <td>14</td> <td>15, 16, 17, 18 (ULLS)</td> </tr> <tr> <td>5</td> <td>17</td> <td>18</td> <td>19, 20, 21 (ULLS)</td> </tr> <tr> <td>6</td> <td>20</td> <td>21</td> <td>22, 23, 24, 25 (LBS)</td> </tr> <tr> <td>7</td> <td>24</td> <td>25</td> <td>26, 27, 28 (LBS)</td> </tr> </tbody> </table> <p>SMIAR Note: PGS - Pikes Gully Seam ULS - Upper Liddell Seam ULLS - Upper Lower Liddell Seam LBS - Lower Barrett Seam Panel numbers as described in document referenced in 1.2v) Note: Prior to the commencement of longwall mining on the first group of panels, the Applicant is required to submit a Subsidence Environmental Management Plan under condition 3.18 and report on baseline monitoring in the AEMR.</p>	SMIAR No	To be submitted at completion of panel No	Panel currently being extracted	Panels in s138 Application	1	3	4	5, 6, 7 (PGS)	2	6	7	8, 9, 10, 11 (ULS)	3	10	11	12, 13, 14 (ULS)	4	13	14	15, 16, 17, 18 (ULLS)	5	17	18	19, 20, 21 (ULLS)	6	20	21	22, 23, 24, 25 (LBS)	7	24	25	26, 27, 28 (LBS)	<p>Monitoring data collected during longwall panels 1, 2, and 3 will be submitted with the next SMP application. This document and application is consistent with the requirements of an SEMP and the DoP has approved ACOs proposal to apply the processes under the SMP guidelines while simultaneously addressing all relevant requirements of the development consent in a combined SMP/SEMP application.</p>
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3.28	<p>Subsidence Monitoring and Impact Assessment Reports shall include, but not be limited to:</p> <ol style="list-style-type: none"> detailed description of the proposed group of longwall panels and workings to be applied for in the section 138 application; comparison of subsidence impacts predicted for completed sections of the underground mine with actual impacts recorded through subsidence monitoring; 	<p>The monitoring proposed will assist in the preparation of this data. The data will be presented with the next submission for SMP approval following longwall panel 3.</p> <p>Proposed subsidence monitoring is outlined in the SMP and within the subsidence assessment provided by SCT (2006) and included as <i>Annex I</i>.</p>																																

No.	Condition	Comment
c)	update information describing the existing environment in the area to be mined including geology, groundwater, surface water, surface topography, aboriginal heritage, land capability, and aquatic and terrestrial ecosystems based on monitoring results from programs under conditions 3.19-3.23 and 4.26, current knowledge and incorporating cumulative impacts from any mining completed on other seams in the area;	
d)	revise subsidence impact predictions for the area to be mined taking into account the results of the above review;	
e)	<p>a Groundwater Management Report prepared by an independent expert to the satisfaction of DIPNR, addressing:</p> <ul style="list-style-type: none"> <li data-bbox="405 730 1234 786">i. work done under and the level of compliance with, the groundwater management measures defined in the Groundwater Management Plan <li data-bbox="405 798 1234 890">ii. identification of trends in groundwater monitoring data and comparison with predictions, in documents referred to in condition 1.2 and any previous SMIARs, over the life of mining operations 	
f)	for SMIAR No. 1, an independent audit of groundwater conditions in panels 1, 2, and 3, and any current monitoring on panel 4, conducted by an independent expert. The audit brief and independent expert are to be approved by DIPNR prior to audit commencement;	
g)	revise the assessment of the impacts of subsidence on geology, groundwater, surface water, surface topography, aboriginal heritage, agricultural suitability, and aquatic and terrestrial ecosystems in the area proposed to be mined;	
h)	detailed assessment of assumptions and uncertainty in predictions and demonstration that sufficient contingency has been built into in the proposal to address this uncertainty;	
i)	demonstrate compliance of the proposal with the conditions of this consent, particularly condition 3.9, and relevant licences, approvals, standards and policies;	
j)	a review of the Mine Plan should excessive subsidence occur on the New England Highway so as to ensure that the Highway is maintained in a safe, serviceable and repairable condition;	

No.	Condition	Comment
	<ul style="list-style-type: none"> k) details of feasible options to appropriately avoid, minimise and remediate impacts from subsidence; l) specific consideration of any requirements of DEC, DIPNR, DPI - Fisheries, DPI - Minerals, MSB, RTA, and the Council; m) results of consultation with CCC, the local Aboriginal community, and affected landholders; n) justification of the proposed longwall extraction plan; o) review the implementation of the SEMP (condition 3.18) and identify any parts of the plan that require modification. If the SEMP requires modification a copy of the revised SEMP shall be submitted with the SMIAR. 	
Heritage Assessment, Management and Monitoring		
3.33	The Applicant shall provide the local Aboriginal community with the opportunity to recover artefacts as approved by the s90 permits, and arrange access to Aboriginal heritage on the site upon receipt of a request.	The need for Section 90 permits under the <i>National Parks and Wildlife Act 1994</i> is addressed in the Archaeology and Cultural Heritage SMP. Consultation will be undertaken and the opportunity to recover artefacts will be provided to the Aboriginal community in accordance with the DEC guidelines. Access to the site is currently available upon request to ACOL.
Adverse longwall mining subsidence impacts		
3.29	The Applicant shall investigate and undertake to the satisfaction of the Director- General, and in consultation with DEC, DIPNR and DPI - Fisheries, alternative mine plans if subsidence impacts, such as impacts on groundwater systems, and potential long-term salinity impacts, as a result of the mine are demonstrated to be greater than those predicted in the EIS or SMIARs. This may include altering mining methods or restricting longwall mining in certain areas.	Mechanisms for this are provided for in the Site Water Management Plan and Groundwater Management Plan.
Licenses		
4.10	The Applicant shall obtain a license from DIPNR under Part 5 of the <i>Water Act 1912</i> for the bores and wells which intersect the groundwater table, including monitoring bores, dewatering bores, longwalls, and other excavations which intersect the groundwater table.	Licences have been obtained (refer to <i>Table 9.1</i>).
4.11	The Applicant shall obtain a permit under Part 3A of the <i>Rivers and Foreshores Improvement Act 1948</i> or the <i>Water Management Act 2000</i> , as appropriate, for works within forty metres of a river as defined under the Act, prior to commencing any works for which the Approval is required.	This requirement is identified in the Land Subsidence Management Plan for remediation works.

No.	Condition	Comment
Groundwater		
4.13	All surface and underground operations including long wall mining shall be conducted to minimise potential impacts on groundwater flow and quality of the alluvial groundwater resource, integrity of the alluvial aquifer and to minimise off-site effects.	The layout of the longwall panels 1 to 4 has been designed to avoid areas known to contain the alluvial groundwater resource to minimise potential impacts. Detail on the predicted groundwater flow and quality impacts are provided in <i>Annex D</i> .
4.14	The Applicant shall undertake regular assessments of the accuracy of the groundwater model against the predictions outlined in the EIS, to the satisfaction of DIPNR. The scope of the assessment shall be determined in consultation with DIPNR and shall include the consideration of the establishment of trigger levels via sensitivity testing, drawdown, pit seepage and river leakage. Should an assessment identify significant differences between the model and EIS predictions, the Applicant shall revise the assessment of the potential impacts on groundwater systems to the satisfaction of DIPNR and implement any further mitigation measures to the satisfaction of DIPNR. The trigger levels for re-assessment of groundwater impacts shall be included in the Groundwater Management Plan required in condition 4.24.	The Groundwater Management Plan, including trigger levels, as provided with the SMP, has been developed in detailed consultation with the Department of Natural Resources through a series of meetings with ACOL. Data gathered to date, and following the commencement of longwall mining (refer to <i>Annex D</i>), will enable a comparison of the model results, actual data and the EIS predictions. The management plan states "In the event of any adverse impacts or water quality degradation beyond predictions in the Bowmans Creek, Glennies Creek or Hunter River alluvial aquifer being detected, ACOL will commission an assessment of the causes and revise the groundwater model. A staged response program, satisfactory to DIPNR to mitigate the adverse impacts, will be developed."
4.15	The Applicant shall develop contingency measures to manage any impacts identified by monitoring that the management strategies have failed to predict or control, particularly relating to groundwaters associated with the alluvial aquifers of Bowmans Creek, Glennies Creek and the Hunter River, to the satisfaction of DIPNR. The implementation of contingency measures shall be linked to performance and cut-off criteria as determined in consultation with DIPNR and specified in the Site Water Management Plan, and shall include both water quality and aquifer pressure levels, should agreed standards or performance indicator levels not be achieved.	Trigger levels to determine impacts through the surface water monitoring program are specified in the Site Water Management Plan. Trigger levels are discussed in the current version of the Groundwater Management Plan (as approved by DPI and DNR), however based on the outcomes of the recent groundwater assessment, the management plan is currently being revised in consultation with the DPI and DNR and will be finalised prior to the commencement of secondary extraction.
4.16	The Applicant shall prepare a statistical assessment to the satisfaction of DIPNR to initially benchmark the pre-mining natural variation in groundwater quality and quantity and to set trigger levels for accepting accountability. The assessment is to be documented in the SWMP (condition 4.24).	Quarterly baseline groundwater data has been collected since 2003 and a statistical summary presented in Table 1 of the approved Groundwater Management Plan.

No.	Condition	Comment
Stream Gauging Infrastructure		
4.23	The Applicant is to negotiate relocation of the stream gauging station located on Bowmans Creek (formally known as stream gauge 210130, Foybrook downstream of Bowmans Bridge) with DIPNR, prior to commencement of underground mining. The relocation of the gauging station will be at the Applicant's cost and will include all aspects of design, replacement, installation, commissioning, and any costs associated with correlation of data between the existing gauge and the new gauge. In line with NSW Government policy, the relocated gauging station is to accommodate fish passage. Any unforeseen cost associated with relocation of the gauging station will also be at the Applicant's cost.	The subsidence impacts from longwall panels 1 to 4 will not affect the gauging station. This condition will be relevant to future panels only.
Underground Mining Groundwater Monitoring		
4.26	<p>Prior to the commencement of underground mining and subject to DIPNR approval, the license holder shall develop and implement a surface and subsurface investigation and monitoring program to assess the likely fracturing of geological strata and hydraulic property changes above each longwall panel. The monitoring program shall provide an interpreted comparison of the results from all longwall panels against pre-mining baseline geological conditions, in order to assess the level of variability of fracture, changes in hydraulic properties between panels, and the impact on groundwater resources and surface expression from underground mining at varying depths. This investigation shall be repeated for each seam as it is mined from the site. The monitoring plan shall:</p> <ol style="list-style-type: none"> a) measure the level of surface water flows, groundwater elevations and water quality prior to mining; b) assess the influence of mine-induced fracturing on aquifers and groundwater quantity; c) assess the influence of mine-induced fracturing and cross aquifer connection on groundwater quality; d) identify sampling locations, monitoring wells/bores along the mine path, to assess the impact of mining in mid-goaf and at the predicted points of tension fracturing, at the edge of each long wall panel; e) prescribe sampling and observation depths, monitoring frequency and parameters for monitoring; and 	ACOL have held a number of 'aquaclude' meetings with DNR with respect to surface and subsurface investigation and monitoring. These meetings also included ACOL specialist subconsultants from SCT and Peter Dundon and Associates Pty Ltd. Based on the advice from these consultants and feedback from DNR, ACOL are currently revising the Groundwater Management Plan and this will be finalised in consultation with DNR and DPI. For current findings and recommendations, please refer also to <i>Annex D, Annex I</i> , the Subsidence Management Plan, and Groundwater Management Plan (ACOL, 2003).

No.	Condition	Comment
	f) specify the compilation, interpretation and reporting of groundwater data and analyses.	
4.28	The license holder shall develop a reporting mechanism, for inclusion in the EMP, in order to: a) verify the predictions of the groundwater modelling used in the Environmental Impact Statement; and b) assess the potential long term changes in groundwater flow and quality which may occur as a result of mining operations and changes to hydraulic properties, as a result of subsidence of the hard rock strata underlying the alluvium.	Refer to <i>Annex D</i> and Groundwater Management Plan (ACOL, 2003).
Relocation of Electrical Transmission Lines		
7.23	The Applicant shall, to the satisfaction of Energy Australia and at its own cost, undertake the relocation and/or construction of any electrical transmission lines which may be required as a result of the development. The Applicant shall also bear any costs associated with relocation of Registered Easements for relocated or new transmission lines required as a result of the development. Such work shall be completed prior to any existing line being affected by mining activity from ACP.	Proposed works to the 132kV electricity transmission line through the middle of the Application Area have been developed in consultation with EnergyAustralia and are documented in the Electricity Transmission Lines SMP.
Utility Services		
7.24	The Applicant shall, to the satisfaction of telecommunications providers and at its own cost, or by agreement with relevant parties, undertake the relocation of any telecommunications cables which may be required as a result of the development.	Consultation with Powertel, Telstra and affected landowners has been undertaken to determine appropriate management measures for the affected telecommunications lines within the Application Area. These measures are documented in the Telstra SMP (telephone cables to residences) and Pothole Management Plan (fibre optic cable).

Table K.2 First Workings SMP Approval Conditions

No.	Condition	Comment
Subsidence Management - General		
1	a) Extent of Approval - This approval relates to the areal extent for first workings development within red edging on the SMP Approved Plan (Drawing No. 00879, signed by the Mine Manager on 7/9/2005.	Workings constructed are wholly within the areal extent indicated (<i>pers comm.</i> , J.Grebert, ACOL Mine Engineer Oct 06).
	b) Extent of Approval - This approval does not specifically relate to the exact layout or any other design details of the first workings as presently detailed on the plan. It is not implied, nor should it be inferred from this approval, that it relates to anything other than the area within which operations may commence. An approval of a subsidence management plan does not constitute s138 approval. The applicant must comply with all relevant legislation and requirements.	The design and construction of first workings using bord and pillar methods is in compliance with the prescriptions under of s138 of the <i>Coal Mines Regulation Act 1982</i> (<i>pers comm.</i> , J.Grebert, ACOL Mine Engineer Oct 06) with respect to first workings. This SMP application is for secondary extraction and a s138 approval will be sought accordingly.
	c) Extent of Approval - This approval does not imply, nor should it be inferred, that any subsequent application for second workings will be approved following first workings operations within the application area.	The second workings SMP is a stand alone application and does not infer that approval will be granted based on the approval of first workings for Longwalls 1 and 2. Secondary extraction will not commence unless SMP approval for secondary workings is issued.
2	Duration of Approval - The approval of this first workings SMP application shall cease to have force and effect once approval is granted for the second workings subsidence management plan or on 5/10/2006, whichever is sooner.	An extension to this expiry date has been requested by ACOL. The longwalls 1 to 4 SMP will supersede the first workings SMP.
3	Seam - These approval conditions relate to the development of first workings in the Pikes Gully Seam only.	First workings are being developed in the Pikes Gully Seam only.
4	Variation to Approval - Any variation to the extent of the approved area for first workings development as depicted on the aforementioned SMP Approved Plan shall be approved by the Director General prior to the changes from the SMP Approved Plan being implemented.	No variations to approval, with the exception of the expiry date, have been sought from the Director General.
5	Any necessary approvals, consents, licences or permits as specified in Section 6.9(2) of the Guideline for Application for Subsidence Management Approvals shall be in place prior to any impact resulting from subsidence.	This SMP application is in accordance with the SMP guidelines and documents the statutory requirements relating to subsidence for longwall panels 1 to 4.

No.	Condition	Comment
6	Notification - The Mine Manager shall give notice to any identified stakeholders, including those listed in Section 6.8.1(1) of the Guideline for Subsidence Management Approvals, that approval to develop first workings within the approved area has been granted. This notification and its distribution list shall be included in the SMP application(s) to extract coal from the longwall panels relevant to this first workings application.	The notification and distribution list has been included in <i>Annex J</i> of the Longwall 1 to 4 SMP.
7	Baseline Monitoring - Baseline Environmental monitoring must be carried out in accordance with a plan approved by the Director, Environmental Sustainability. This plan shall be provided no later than three (3) months following this approval of the first workings SMP.	Baseline monitoring has been carried out in accordance with the following management plans: Groundwater Management Plan, Site Water Management Plan, and Flora and Flora Management Plan and other plans as specified in the Environmental Management Strategy. These plans have been submitted and approved by the relevant Departments as specified in the development consent.
8	Directive for Variation or Revocation - By notice in writing the Director General may vary or revoke this approval at any time.	No notice to this regard has been received by ACOL.
9	Environmental monitoring shall be conducted in accordance with the associated management plans.	Environmental monitoring has been carried out in accordance with the associated management plans. Results of monitoring for various environmental aspects is provided in <i>Annex C</i> (Bowmans Creek Geomorphology premining assessment), <i>Annex D</i> (Groundwater Assessment) , <i>Annex E</i> (Flora and Fauna monitoring of Bowmans Creek), <i>Annex G</i> (Flora and Fauna monitoring - includes the southern woodland). It is also a requirement that environmental monitoring is reported in the AEMR.
10	Remediation works shall be conducted to the satisfaction of the Director, Environmental Sustainability.	No remediation works have been required for the first workings.
11	All remediation works and associated monitoring is to be documented and reported in the Ashton Annual Environmental Management Report to the satisfaction of the Director, Environmental Sustainability.	All monitoring results are included in Ashton's AEMR. Reporting requirements have been included <i>Section 6</i> of the Longwall 1 to 4 SMP.

No.	Condition	Comment
12	The Mine Manager shall ensure that the limit of extraction of longwall panels 1 and 2 be such that the stability of any sections of the river, creek banks and adjoining cliff lines will not be adversely affected by subsidence.	Subsidence predictions and impacts on all identified surface and subsurface features including the Hunter River, Glennies Creek and Bowmans Creek are addressed in <i>Sections 7 and 10</i> of the Longwall 1 to 4 SMP. The stability of the river, creek banks and adjoining cliff lines will not be adversely impacted by subsidence. A slope stability assessment prepared by Parson Brinkerhoff is included as <i>Annex E</i> .
13	The development of any first workings within 26.5 degrees angle of draw from the 132kv Transmission Line shall be subject to the terms of an investigation programme for the powerline. This programme shall be developed jointly with the owner/operator of the infrastructure, in consultation with the Mine Subsidence Board and Principle Subsidence Engineer. Prior to the development of the said first workings, the investigations shall be submitted to the Principle Subsidence Engineer.	This investigation has been completed for the joint 132/66kV transmission line adjacent to the New England Highway. The development of tailgate 1 is progressing towards one pole of 132kV line through the middle of the Application Area, and the results of the investigation will be submitted to the Principle Subsidence Engineer once complete and prior to works entering the 26.5 degree angle of draw from said pole.
14	The Mine Manager shall ensure the safety of road users and the serviceability of the New England Highway shall not commence unless the layout of the Headings has been adequately designed for subsidence management purposes to the satisfaction of the Principal Subsidence Engineer.	The RTA and has been consulted and a risk assessment conducted with respect to the New England Highway during the SMP process and a Pothole Management Plan developed (refer to <i>Annex F</i> of the SMP). Headings beneath the highway were developed following approval by the Chief Inspector of Coal Mines 24/1/2006. DPI File No (05/1688)
15	The Mine Manager shall ensure that the southern limit of Longwall panels 1 and 2 be determined after review(s) of potential subsidence impacts on any alluvial aquifers in the Application Area. This review shall be conducted with the Department of Infrastructure, Planning and Natural Resources, Director Environmental Sustainability (or delegate), Principal Subsidence Engineer and any other relevant stakeholders. The development of the installation roads for Longwall Panels 1 and 2 shall not commence unless the said review(s) have been conducted to the satisfaction of the Director Environmental Sustainability.	Investigations into alluvial aquifers has been conducted in conjunction with 'aquaclude' meetings between ACOL and DNR. The start position of longwall 1 was also discussed with the DPI during a meeting to discuss the SMP process. The start position of longwall panel 1 has been redesigned following investigations by Peter Dundon and Associates Pty Limited (refer to <i>Annex D</i>). An assessment of groundwater impacts based on the current longwall panel layout is provided as <i>Annex D</i> is provided for the consideration of the relevant parties. In summary, this assessment identified that no impacts to saturated alluvium associated with Bowmans Creek and the Hunter River are predicted. Draw down in the Glennies Creek alluvium is expected to be less than 0.5 metres.

Table K.3 Mining Operations Plan (MOP)

Section #	Requirement	Compliance
Introduction		
1.2.1	All operations are managed in accordance with a series of Environmental Management Plans (EMPs), which have been developed by Ashton in accordance with the requirements of the development consent.	Compliance with the Environmental Management Plans is reported annually in the AEMR.
1.2.1	It is anticipated that an area of responsibility for the Underground Mine Manager will be defined in early 2006, following completion of open cut operational activities in that area.	Completed and plans posted/distributed internally regarding statutory responsibility for each area.
1.2.1	A second continuous miner will be commissioned in 2 nd quarter 2006 to enable simultaneous development of the tailgate and maingate roads for Longwall Panel 1 in the Pikes Gully Seam, whilst the longwall is expected to be installed in January 2007.	There are now three continuous miners in place.
1.2.1	Ashton will comply with the requirements of the development consent and Environment Protection Licence, which limits total production from the project to 5.2 Mtpa of ROM coal.	Total ACOL production plans remain consistent with the 5.2Mtpa ROM limit.
1.3	The Development Consent requires the development and approval of 22 Environmental Management Plans (EMP) that provide detail of how specific environmental issues will be managed on site.	These plans have been prepared – as listed and summarised in the ACOL's Environmental Management Strategy (2005a).
1.4	Rehabilitation security deposits for the underground mine will be completed using the calculation spreadsheet approved by DPI – MR followed by a meeting with the DPI – MR Environmental Sustainability Branch.	The security deposit was calculated and the calculation accepted by the Environmental Sustainability Branch for the underground mine in March 2006.
1.4	At the commencement of operations the Mine Manager and Environmental Manager shall be Mine Manager: Brian Wesley, Environmental Officer: Peter Horn. Where changes are made to the appointment of the above two positions, the DPI shall be duly notified.	The Environmental Officer position is currently being filled by Lisa Richards. DPI has been notified of this change of appointment.
Pre-Mop Environment		
2.0	EIS commitments to the maintenance of this infrastructure will be maintained but the actual plan for maintenance of this infrastructure is yet to be negotiated with the stakeholders.	This negotiation has formed part of the SMP process and the outcomes have been incorporated into the relevant management plans.

Section #	Requirement	Compliance
2.1	Bowmans Creek, an unregulated stream considered “iconic” by the Department of Natural Resources (pers. comm. – Fergus Hancock, 2005), ACOL consent conditions require significant studies of riparian and aquatic flora and fauna associated with this stream	A detailed benchmark survey by Pegasus has been completed and a pre-mining assessment of Bowmans Creek (ERM) is included as <i>Annex C</i> to this Written Report. Two rounds of aquatic monitoring also complete (refer to <i>Annex F</i> .)
<i>Proposed Mining Activities</i>		
3.1	Additional surface drilling is planned to occur in early 2006. This drilling will concentrate on Longwall Panels 1 and 2 and will be used to enhance the geological model for these panels.	This drilling has commenced and is ongoing. Some of the relevant geological reports are provided in <i>Annex B</i> .
3.1	A series of holes will be drilled in late 2005 as part of the Groundwater Management Plan. These holes will be utilised to monitor groundwater levels in the different aquifers, but will also provide additional information that will be used to verify the geological model.	Drilling completed – results are discussed in the Groundwater Assessment (<i>Annex D</i>).
3.2.2	Any land clearing required for the underground will be conducted in accordance with the Topsoil Stripping Management Plan, the Flora and Fauna Management Plan, the Land Management Plan, the Landscape and Rehabilitation Management Plan, the Erosion and Sediment Control Management Plan, the Site Water Management Plan and the Environment Protection License (NSW DEC EPA).	No land clearing has been undertaken nor proposed under this Subsidence Management Plan.
3.2.2	Prior to any clearing activity associated with the project, flora and fauna surveys (including a fauna trapping and relocation program) will be conducted.	No land clearing has been undertaken nor proposed under this Subsidence Management Plan.
3.2.2	Vegetation removal will only be conducted after the installation of water diversions and erosion and sediment controls as per the approved management plans.	No land clearing has been undertaken to date, some tree removal is proposed under this management plan and this will be conducted in accordance with the relevant management plan.
3.2.2	Selected trees will be felled and where possible, stockpiled or relocated to the southern woodland to provide a replacement habitat for local fauna. Remaining vegetation will be recycled.	Trees removed from the open cut pit have been relocated south of Glennies Creek road and stockpiled to provide foraging habitat for the threatened grey-crowned babbler.
3.2.2	Land disturbance will be minimised by clearing the smallest practical area of land for the shortest possible time.	No land clearing has been undertaken nor proposed under this Subsidence Management Plan.
3.2.2	Disturbed areas will be rehabilitated with the aim to achieving a post-disturbance landform visually compatible with the surrounding landscape with a sustainable native species or pasture vegetative cover.	This SMP does not contradict this commitment.

Section #	Requirement	Compliance
3.2.3	Where topsoil stockpiling is required, cleared topsoil will be stockpiled in designated areas prior to disturbance in accordance with the Soil Stripping Management Plan.	This SMP does not contradict this commitment.
Surface Infrastructure		
4.2.2	Most of the infrastructure related to the underground mine is being established within the Arties Pit, thereby reducing the effects of noise and lighting impacts on neighbours and the travelling public.	This SMP does not contradict this commitment.
4.2.3	No explosives will be stored within the underground mine area. Any explosive requirements will be stored within the existing open cut explosives magazine.	This SMP does not contradict this commitment.
Mining Operations		
5.2	The development consent requires that there be no direct connective cracking between the alluvium associated with Bowmans Creek and the mine workings and defines a series of Subsidence Monitoring Impact Assessment Reports to be submitted to DIPNR and approved before longwall mining commences beneath Bowmans Creek.	Longwalls 1 to 4 are outside the Bowmans Creek saturated alluvium. This issue has been assessed in the Groundwater Assessment by Dundon (2006) and Subsidence Predictions by SCT (2006). Further assessment and monitoring will be undertaken prior to mining subsequent longwalls under the creek.
5.2	A monitoring regime will be established to verify the results of the modelled changes to the groundwater regime.	Groundwater monitoring has been detailed within the Groundwater Management Plan (ACOL, 2003) as approved by DPI and the Longwalls 1 to 4 SMP.
5.2	Baseline flora and fauna surveys along Bowmans Creek have also commenced. The surveys will be revisited on a regular basis to identify any impacts from the mining.	A pre-mining assessment of Bowmans Creek riparian habitats and two rounds of aquatic monitoring have been completed.
5.4	Water from the Hunter River will be extracted via existing water licences and pumped to a storage tank on the surface in the vicinity of the main administration building.	Licences have been obtained. Refer to <i>Table 9.1</i> .
5.4	Groundwater inflow will also be extracted from the mine by pumping to the Arties Pit sump where it will be pumped to the process water dam for reuse.	Groundwater inflows have been assessed by Dundon (2006) in <i>Annex D</i> .
5.4	Water from the underground mine will be pumped to a sump in the Arties Pit near the portal entries to the mine and thence to the Process Water Dam for reuse watering haul roads in the open cut or as process water for the CHPP.	This is covered in the Site Water Management Plan.
5.6	Blasting in the underground mine would be conducted in accordance with a Shotfiring Management Plan and involve approved explosives, electric initiation and delays.	This SMP does not contradict this commitment.

Section #	Requirement	Compliance
5.6	Explosives would be stored in the existing Open Cut explosives magazine.	This SMP does not contradict this commitment.
5.6	The Shotfiring Management Plan will be developed in compliance with the Blasting/Vibration Management Plan.	This SMP does not contradict this commitment.
5.6	Apart from the development of the initial box-cut for the underground mine portal - now complete, which was addressed in the Open Cut Phase 1 Environmental Management Strategy and the Blasting and Vibration Management Plan, no blasting activities should be required in relation to the underground mine.	This SMP does not contradict this commitment.
Environmental Risk		
6.1	The ventilation fans will bring minor amounts of dust to the surface and may result in some visual impact from water vapour.	No variation from this prediction has been noted.
6.2.1	The surface infrastructure area for the underground has a catchment of 14Ha and surface water is directed into a sump with a capacity of 25ML. This sump also acts as the transfer point for underground pit discharge. Water is transferred to the process water dam from this point.	This SMP does not contradict this commitment.
6.2.1	The development of mains and gate roads associated with the first workings will not result in any surface subsidence and will therefore not affect surface water flows.	This has been confirmed to date via survey monitoring of the New England Highway. Supporting data is provided in <i>Annex M</i> .
6.2.1	The Subsidence Management Plan and the Subsidence Environmental Management Plan will address the methods by which the potential for subsidence-induced erosion will be managed.	Monitoring of erosion is included in the Site Water Management Plan (ACOL, 2006) and specific Land SMP.
6.2.1	Likewise, longwall mining beneath the Bowmans Creek alluvium will result in localised ponding of water. Care will need to be taken to avoid scouring of the creek bed between pools or the development of nick points in the creek bed.	Bowmans Creek will not be impacted by mining subsidence of longwall panels 1 to 4 in the Pikes Gully Seam. This condition will apply to future workings and will be dependent on the results of ongoing monitoring.
6.2.1	Care will need to be taken to avoid the potential for connective cracking between the underground mine workings and the Bowmans Creek alluvium.	Bowmans Creek will not be impacted by mining subsidence of longwall panels 1 to 4 in the Pikes Gully Seam. This condition will apply to future workings and will be dependent on the results of ongoing monitoring.
6.2.2	The mining strategy will ensure that the depth of mining in the zone beneath the alluvials associated with Bowmans Creek will be sufficient to provide an aquaclude.	Longwalls 1 to 4 are outside the Bowmans Creek saturated alluvium. This issue has been assessed in the Groundwater Assessment by Dundon (2006) and Subsidence Predictions by SCT (2006). Further assessment and monitoring will be undertaken prior to mining subsequent longwalls under the creek.

Section #	Requirement	Compliance
6.3	The commencement of underground mining operations will require the installation of two ventilation fans.	This SMP does not contradict this commitment.
6.4	Particular attention will be given to ensuring that the access road to property No 130 (located at the south east corner of the Mine Lease) is maintained in a safe and trafficable condition (subsidence).	This issue has been addressed in the Longwalls 1 to 4 Subsidence Management Plan. In consultation with the landowner, daily management of the condition of the road and consultation with the landowner aims to ensure safe uninterrupted access to Property No. 130.
6.4	The impact of subsidence on Bowmans Creek will be closely monitored, with flora and fauna monitoring programs identifying any significant changes to the aquatic habitat. Baseline monitoring will continue until the commencement of longwall operations under Bowmans Creek and then specific monitoring events will be triggered for each pass under the creek. Monitoring will then continue post mining for at least five years.	A pre-mining assessment of Bowmans Creek riparian habitats and two rounds of aquatic monitoring have been completed. Results are provided in <i>Annex C</i> , and <i>Annex F</i> .
6.4	The angle of draw for mine subsidence will be kept outside of the New England Highway Road Reserve. No tunnelling or mining will occur directly beneath the piers or abutments of Bowmans Creek Bridge, with the layout of the headings in this area being designed in conjunction with the RTA.	This has been confirmed within the longwalls 1 to 4 SMP.
6.4	A survey of the highway alignment conducted jointly with RTA personnel will be conducted prior to any mining works under the highway.	This was completed prior to the development of first workings.
6.5	The southern woodland area has been retained as a conservation area with a separate Plan of Management. No underground site infrastructure (ventilation, gas vent etc) is planned to be located within the Conservation Area.	No infrastructure is proposed and the draft plan of management has been submitted to DEC (National Parks) for review.
6.5	Woodland areas may experience erosion as a result of subsidence, particularly in areas of poorly developed living ground cover, for example, where Bull Oak forms dense stands. Regular inspections and review will determine the extent of any impacts and identify the most effective rehabilitation methods and rehabilitation maintenance required.	Monitoring has been detailed in the Flora and Fauna Subsidence Management Plan.
6.5	The Development Consent also requires Ashton to monitor the condition of watercourses above longwall panels in the mining area to identify any impacts on aquatic habitats or fish passage, and implement appropriate actions if and when adverse impacts occur.	Bowmans Creek will not be impacted by mining subsidence of longwall panels 1 to 4 in the Pikes Gully Seam. This condition will apply to future workings and will be dependent on the results of ongoing monitoring.

Section #	Requirement	Compliance
6.6	The surface impact of subsidence on Indigenous heritage will be monitored, with any necessary rehabilitation being expeditiously undertaken. If sites are at risk of destruction through erosion, permission will be sought to excavate, record and salvage the site under a Section 90 permit.	Monitoring and pre-mining surveys have been detailed in the Cultural Heritage Subsidence Management Plan. The pre-mining surveys will confirm the extent of the sites and address the need for Section 90 consents.
6.7	The visual impact of the underground mine will be minimal. The mine entrance and ventilation fans will be located in a box-cut and will be shielded from Camberwell village and the New England Highway. No structures are planned for the area south of the New England Highway.	This SMP does not contradict this statement.
6.8	ACOL intends to maintain and improve the quality of the pasture and its stock-carrying capacity.	Issues relating to carrying capacity are addressed in specific management plans: Land SMP, Farm Dams SMP.
6.8	The underground mine should have minimal impact on the quantity and quality of the land suitable for grazing, but care will be taken to ensure that disruption to drainage paths is quickly corrected to avoid scouring.	A specific Land SMP has been prepared that addresses erosion, surface drainage, surface cracking and ponding.
6.8	ACOL will endeavour to maintain or improve the current agricultural suitability of the land post mining. Where fencing or irrigation systems are required to be repaired or replaced post subsidence this will be done.	Remediation of these structures is covered by specific SMPs.
Emplacement of Waste Materials		
6.5	Rejects from underground coal will be controlled and managed by the Open Cut MOP as responsibility for the coal and rejects pass from Underground to Coal Preparation Plant and then to Open Cut.	This SMP does not contradict this statement.
Water Management Systems		
7.0	It is proposed to develop a Site Water Management Strategy before the end of April 2006 that will further detail site water management and direct site water flows and planning. The strategy will detail the interaction between inflows (surface and groundwater), open cut, underground and CHPP with respect to water use.	Detail of how water is classified and managed is contained within the Site Water Management Plan.
7.0	Waters of different quality will be kept separate in accordance with the requirements of the development consent.	Detail of how water is classified and managed is contained within the Site Water Management Plan.
7.0	Ashton does not possess any licence to discharge water into nearby streams and has committed to the retention of a 100 year, 72 hour duration storm event without the need for discharge.	Detail of how water is classified and managed is contained within the Site Water Management Plan.

Section #	Requirement	Compliance
Flora and Fauna Management		
8.0	The southern woodland is expected to improve as the woodland naturally regenerates and additional areas are revegetated with species that are typical of the area and as weeds and feral grazers/predators are managed.	The regeneration of the southern woodland and habitat corridors has been detailed in the Flora and Fauna Management Plan and the Landscape and Revegetation Management Plan.
8.0	Riparian habitat management south of the New England Highway will be limited to weed control and revegetation to enhance wildlife movement along the riparian corridors.	This SMP does not contradict this statement.
8.0	Weed incursion and habitat loss within the riparian vegetation along Bowmans Creek will be monitored bi-annually.	A pre-mining baseline assessment of Bowmans Creek riparian habitats and two rounds of aquatic monitoring have been completed.
8.0	Some aquatic habitats will be strategically managed to create and improve habitat for the green and golden bell frog.	As existing ponds or adjacent pools are likely to be continually colonised by Mosquito Fish it is no longer practicable to manage these for the threatened green and golden bell frog.
8.0	Where the aquatic environment is within pasture that is grazed, efforts will be made to restrict stock to defined access points to ensure water quality is maintained. With the exception of designated watering areas stock will be excluded from at least 20m from the high water mark, allowing vegetation to establish to provide foraging and refuge opportunities.	This has been detailed within the Flora and Fauna Management Plan.
8.0	A program to establish potential foraging resources for threatened species will be initiated.	This has been detailed within the Flora and Fauna Management Plan. Trees removed from the open cut pit have been relocated south of Glennies Creek road and stockpiled to provide foraging habitat for the threatened grey crowned babbler.
8.0	Revegetation of nick points or cracking associated with subsidence will be conducted as soon as the subsidence is complete for that pass of the longwall.	This is addressed in the Land SMP.
8.0	The revegetation schedule will be reliant on the level of impact and the directions of the Landscape and Revegetation Management Plan with respect to tree corridors and grazing or pasture end use.	This has been detailed in the Landscape and Revegetation Management Plan.
8.0	There may also be a need to revise revegetation options to include some aquatic rehabilitation of low lying subsided areas. Should this become necessary, a procedure will be developed to enhance these areas through habitat creation with the objectives of improving diversity and protecting soils and water quality.	This will be considered upon the completion of subsidence under this SMP.

Section #	Requirement	Compliance
8.0	Weeds in the southern woodland conservation area will be managed under the regime specified in the Plan of Management.	Details of weed control are given in the Landscape and Revegetation Management Plan.
8.0	Nestboxes will occur in a variety of habitats, increasing the potential for boxes occurring in habitats favourable to displaced or dispersing animals. A research program will be incorporated into the monitoring program of the constructed roosts and dens.	42 nest boxes have been installed within the southern woodland and along Bettys Creek. No population analysis has been undertaken as not enough data has been collected at this stage of the monitoring program.
8.0	Roost and den box design and positioning will be re-evaluated if targeted species are known to occur in the area but are not using the boxes every five years.	The nest boxes are monitored in conjunction with the bi-annual fauna monitoring surveys. The location and design will be re-evaluated following five years on monitoring data.
8.0	Small piles of timber will also be placed within the southern woodland area and to the south of Glennies Creek Road to provide habitats for relocated animals and to increase shelter and foraging opportunities for animals already within the woodlands. Some timber will be used within dams to provide perches for wetland species and refuge for amphibians. The area to the south of the Highway will require the addition of vegetation corridors to provide links between the riparian areas and remnant vegetation.	Trees removed from the open cut pit have been relocated south of Glennies Creek road and stockpiled to provide foraging habitat for the threatened grey crowned babbler.
8.0	Some habitat enhancement planting will be required in the southern woodland to increase diversity and reintroduce species that have been removed since European occupation of the area.	Details of enhancement planting are given in the Landscape and Revegetation Management Plan.
8.0	Culls of feral animals in conjunction with macropod control programs will be conducted on a seasonal basis. Macropod control will be governed by the requirements of surrounding landholders and or assessment by DNR approved ecologists.	This has been detailed within the Flora and Fauna Management Plan and is being undertaken on a continuous basis.
8.0	Long term post mining land use objectives are to create a mosaic of agricultural land and wildlife habitat. These shall be achieved by limiting stock access to riparian habitats (this may require the establishment of alternative water sources), and by allowing the continued grazing of stock, including within some woodland units once they have been established.	This has been detailed within the Landscape and Revegetation Management Plan and the Flora and Fauna Management Plan.
8.0	The retention of fencing will allow the rotation of grazing within woodland units allowing the regeneration process to be controlled in the long term and to aid in bushfire hazard reduction by grazing.	This has been detailed within the Flora and Fauna Management Plan.

Section #	Requirement	Compliance
8.0	Upon the identification of threatened species all work impacting the habitat of the threatened species will cease until it can be determined if the species is at a critical part of the species life cycle. Work will not recommence until the species has vacated the habitat or can be relocated.	This has been detailed within the Flora and Fauna Management Plan.
8.0	Breeding animals will not be disturbed or non breeding animals will not be relocated without the consent of the DEC.	All work impacting the habitat of the threatened species will cease until it can be determined if the species is at a critical part of the species life cycle.
8.0	Should site inspections identify a 'new' (to the site) threatened species, an assessment will be made of the likelihood of impact by subsidence or other underground mining activities by a DNR approved ecologist. Should significant impact be identified, a set of ameliorative actions will be developed by the ecologist and site Environment Officer.	A booklet identifying threatened species has been supplied to mine construction earthworkers and the Environmental Officer to assist in the identification of threatened species.
8.0	Habitat and species monitoring will take place for the duration of the mine or until it can be established that no significant impact will occur to threatened species as a result of the mining operation.	Details of weed control are given in the Landscape and Revegetation Management Plan.
8.0	Monitoring will include; <ul style="list-style-type: none"> ▪ Monitoring of revegetated wildlife corridors will take place bi-annually; ▪ The monitoring of the grey-crowned babbler populations will take place in each season to determine habitat use and to judge breeding success; ▪ The roost and nest boxes are to be inspected bi-annually; and ▪ Terrestrial fauna will be monitored by the bi-annual trapping of small and arboreal mammals at established locations in the existing woodland revegetated woodland and key wildlife corridors. Pitfall traps will be established in these areas. Timed observations of bird species will be made at specific locations within the woodland and corridors. In addition to the monitoring of the revegetated areas, the fauna of both revegetated habitats and remnant habitats will be monitored to investigate the success of habitat enhancement for the grey-crowned babbler. The woodlands will be inspected for evidence of grey-crowned babbler, including direct observation of the species and evidence including nests and communal roosts. 	Bi-annual monitoring requirement is included in the Flora and Fauna Management Plan (ACOL, 2005b). Bi-annual fauna surveys are conducted within the southern woodland conservation area.

Section #	Requirement	Compliance
8.0	Monitoring of flora and fauna in the Conservation Area will be undertaken in accordance with the Plan of Management.	Bi-annual fauna surveys are conducted within the southern woodland conservation area. Current results are contained within <i>Annex H</i> .
8.0	Vegetation surveys within established rehabilitated tree plots will be conducted annually after three years.	Details of rehabilitation and monitoring are detailed in the Landscape and Revegetation Management Plan.
8.0	Where, after three years, there is a significant loss of a particular group of plants (for example fabaceous twiners) seed sourced from the local area will be used to establish that group where possible.	Details of rehabilitation and monitoring are detailed in the Landscape and Revegetation Management Plan.
8.0	Where tube stock is used, monitoring will identify if a significant loss of trees or shrubs has occurred and a program of revegetating these areas will be undertaken to ensure the final landscape plan is achieved.	Details of rehabilitation and monitoring are detailed in the Landscape and Revegetation Management Plan.
8.0	Weekly inspections of areas where subsidence is active will identify any cracking or the development of nick points where erosion could advance. These will be rehabilitated as soon as the subsidence is complete for that pass of the longwall (to prevent reworking) with cracks filled and nick points removed through earth works followed by revegetation in accordance with the Landscape and Revegetation Management Plan.	The monitoring of active subsidence areas has been incorporated into the Land SMP.
Site Security		
9.0	Whilst the Development Consent permits the operation of the Underground Mine on the basis of 24 hours per day, 7 days per week, the present intention is that the Underground Mine will be operated 24 hours per day from Monday to Friday, with maintenance crews providing similar coverage on the weekend. Responsible personnel will therefore always be on site to maintain security of the Underground Area.	This SMP does not contradict this statement.
9.0	Open cut operational and maintenance staff are also on site 24 hours per day, seven days per week to address visitors to the site and to ensure that there are no breaches of security.	This SMP does not contradict this statement.
Spontaneous Combustion		
10.0	The prevention, detection and management of spontaneous combustion will be in accordance with the requirements of the Spontaneous Combustion Management Plan, as well as the Atmospheric Management Plan for the underground mine.	This SMP does not contradict this statement.

Section #	Requirement	Compliance
Archaeology and Heritage		
11.0	Several sites containing Aboriginal artefacts have been identified in the underground project area. Some of the most significant of these will be addressed by inclusion in the Conservation Area as noted above.	The pre-mining surveys will confirm the extent of the sites with the Longwalls 1 to 4 SMP, which includes the southern woodland conservation area.
11.0	Detailed plans of impact on Aboriginal artefacts will be addressed in the Subsidence Management Plans and by Section 90 permits.	Monitoring and premining surveys have been detailed in the Cultural Heritage Subsidence Management Plan. The premining surveys will confirm the extent of the sites and address the need for Section 90 consents.
11.0	Identified archaeological sites will be marked or fenced to enable ready identification and allow for regular inspections. As longwall mining progresses under identified archaeological sites, they will be checked for damage and subsidence rehabilitation will be designed to preserve archaeological site integrity where possible.	Following the confirmation of site locations and extents, the site will be marked in the field to allow for ongoing monitoring.
11.0	Where sites are at risk based on projected subsidence cracking or other high erosion risk locations, they will be recovered under Section 90 permits prior to longwall mining in that area.	The pre-mining surveys will confirm the extent of the sites and address the need for Section 90 consents.
Environmental Monitoring – Air Water and Noise		
12.2	The water quantity and quality in major streams within or bounding the Ashton project area including Bowmans Creek, Bettys Creek, Glennies Creek and the Hunter River are monitored with an analysis regime that is detailed in the Site Water Management Plan at the locations identified in the EIS.	This SMP does not contradict this statement.
12.2	The groundwater monitoring program is designed to monitor water levels and water quality in the following components of the groundwater system: <ul style="list-style-type: none"> • Alluvial aquifers associated with Bowmans Creek; • Alluvial aquifers associated with Hunter River; • Aquifers within the coal seams proposed to be mined in the underground mine; • Coal measures aquifers above the goaf of the underground mine; • Coal measures aquifers between the open cut and Glennies Creek; and • The regional coal measures aquifer system. 	The Groundwater Management Plan is currently being updated based on the recommendations in Dundon (2006) and will be submitted to the relevant agencies for consideration.
12.2	The groundwater monitoring program will also be coordinated with the surface water monitoring related to potential subsidence impacts on the Bowmans Creek and Hunter River alluvial aquifers.	This SMP does not contradict this statement.

Section #	Requirement	Compliance
12.2	In addition to monitoring for local and regional impacts of the underground mine on groundwater levels and quality, the consent conditions required a detailed assessment to be made of the effects of subsidence on hydraulic conductivity (permeability) of the strata between the goaf and the base of the Bowmans Creek alluvium.	This is discussed in the Groundwater Assessment and is also subject to ongoing consultation.
12.2	The on-site screening analysis will include pH, total dissolved solids (TDS), electrical conductivity (EC) and temperature. Comprehensive laboratory analysis will include: <ul style="list-style-type: none"> Physical parameters - pH, TDS, EC, turbidity, total suspended solids (TSS); Major ions - Ca, Mg, Na, K, Cl, SO₄, HCO₃, CO₃; Dissolved metals - Al, As, Cd, Cr, Cu, Fe, Pb, Mn, Hg, Ni, Se, Zn; and Nutrients/other - Ammonia, nitrate, phosphorus, cyanide, fluoride. 	Monitoring procedures are detailed in the Site Water Management Plan.
Additional Information		
13	Additional information to the management of mining operations is addressed in detail in the Environmental Management Plans (EMP), which have been developed in consultation with the various government agencies and interested parties and are approved in accordance with the development consent for the project.	The SMP and associated specific SMPs are intended to form part of ACOLs overall Environmental Management System and will not be used in isolation. They are consistent with the existing management plans prepared for the site.

Cracking model? Also part of aquaclude study using subconsultants and representatives of DNR.