

ASSESSMENT REPORT

Angus Place Colliery Roadways Development (06_0021 Mod 4)

1. BACKGROUND

Angus Place Colliery (Angus Place) is an underground coal mine located 5 kilometres (km) northeast of the village of Lidsdale and 15 km north of Lithgow (see **Figure 1**). Angus Place is owned by a joint venture between Centennial Springvale Pty Limited and Springvale SK Kores Pty Limited, and is operated by Centennial Angus Place Pty Ltd (Centennial).



Figure 1: Regional location

The mine comprises a pit top facility and underground mining area (see **Figure 2**) and supplies coal to the nearby Mount Piper and Wallerawang Power Stations. The underground workings are mainly located beneath the Newnes State Forest, which is managed for timber production by the Forestry Corporation of NSW. Centennial also operates ancillary mining infrastructure in the Newnes State Forest, including dewatering boreholes, ventilation facilities, pipelines and underground cables.

The mine has been operating since 1979, and is regulated under a project approval (06_0021) which was granted in September 2006 by the then Minister for Planning. The project approval, which has been modified three times since its grant, allows Centennial to extract up to 4 million tonnes per annum (Mtpa) of coal by longwall mining methods until 2024, to process this coal at the Angus Pace pit-top facility and deliver it via private haul roads to the power stations. The approval also allows development of limited underground main headings (or 'mains') and longwall headings (or 'roadways') within an area east of the current longwall layout (see **Figure 2**).

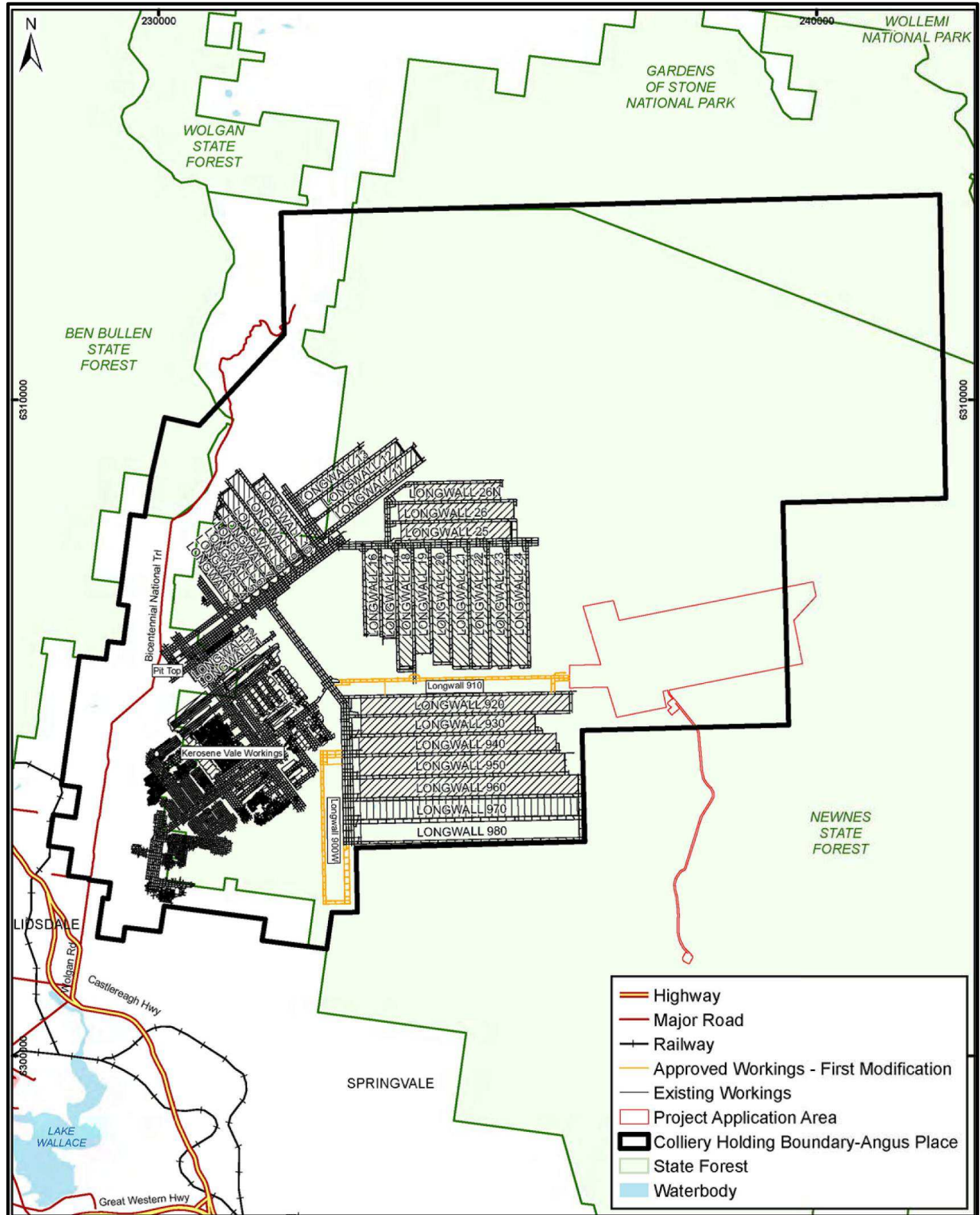


Figure 2: Approved mine layout

Angus Place Extension Project

The Department recently exhibited Centennial's State Significant Development (SSD) application (SSD 5602) and Environmental Impact Statement for the Angus Place Extension Project. This proposal includes expanding the underground mining area to the northeast (see **Figure 3**) to extract an additional 19 longwall panels and would allow the mine to continue operating until the end of 2032.

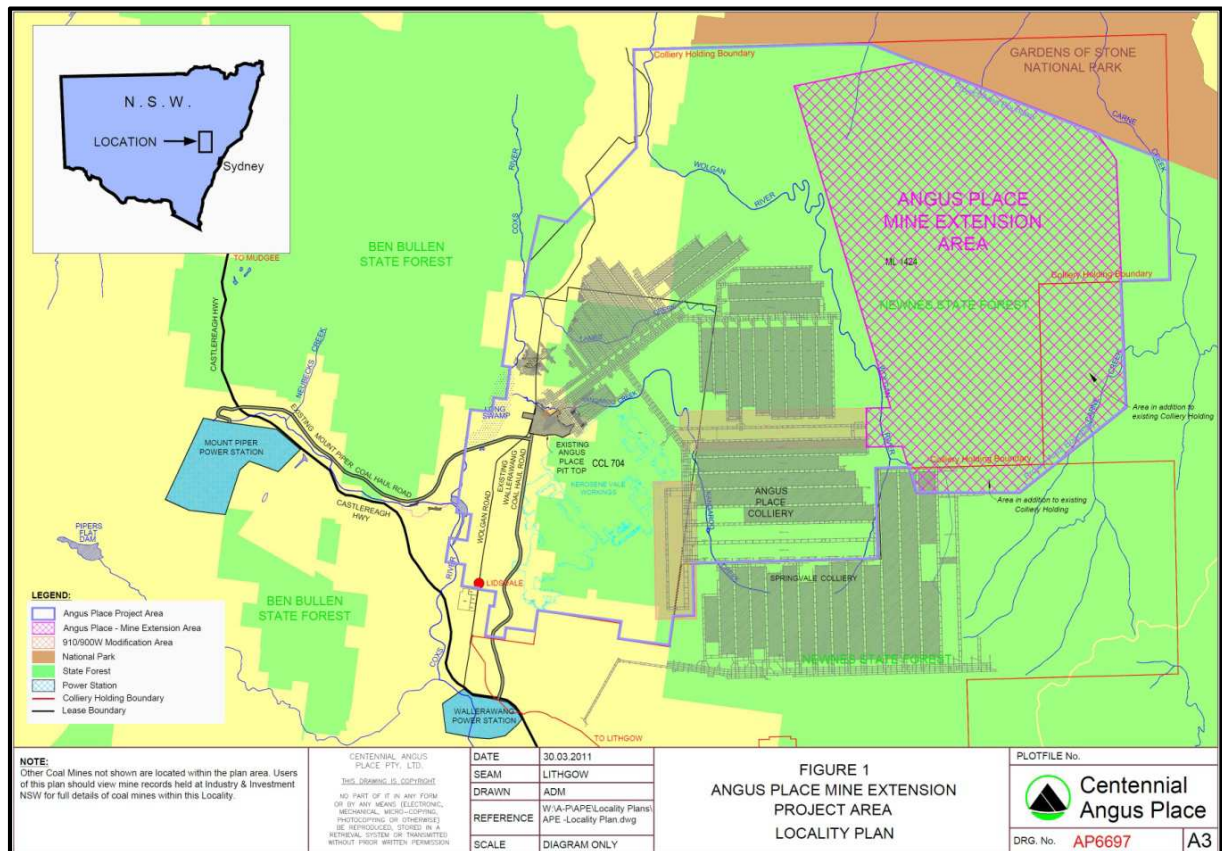


Figure 3: Proposed Angus Place Extension Project

2. PROPOSED MODIFICATION

Centennial has requested that its existing project approval is further modified. The proposed modification (06_0021 Mod 4) seeks approval to undertake first workings to further develop the roadways for two proposed longwall panels (LW 1001 and LW 1003) in the area of the Angus Place Extension Project (see lilac outline in **Figure 4**).

In April 2013, Centennial was granted approval (06_0021 MOD 2) for limited development of main headings and roadways in the area of the Angus Place Extension Project, immediately east of the existing mine plan (see royal blue outline in **Figure 4**). This allowed development of mains to support the first four longwall panels, and driving the tailgate headings and installation roadways which partially outlined the first of these longwall panels. Centennial stated that this modification formed part of its investigations into the feasibility of the mine extension for which it has now made its SSD application. It also allowed for continuity of mine development (ie it provided for the maintenance of sufficient 'development float' to support continuous future longwall extraction).

Effectively, the proposed modification seeks approval to continue the development of the first two longwall panels (but not their extraction), by completing their tailgate roadways, maingate roadways and installation roadways.

Centennial's position is that MOD 4 is required in order to ensure continuity of mine development at the mine to overcome the gap in timing between approved workings and the expected date of determination of its SSD application for the Extension Project. Centennial wishes to continue the development of first workings while the assessment and determination of SSD 5602 is being undertaken. Centennial has made the following arguments to justify the proposed modification:

- the roadways would be designed to be stable, and their development would not result in any measurable subsidence impacts;
- if these roadways are not developed now, then commencement of extraction in the Extension Project (if it is approved) could be significantly delayed; and
- not undertaking these works now could lead to mine workers being stood-down for a considerable period.

Centennial has proposed no other operational or administrative changes to the mine under this modification. The proposed modification is detailed in full in Centennial's Environmental Assessment (EA – see **Appendix A**).

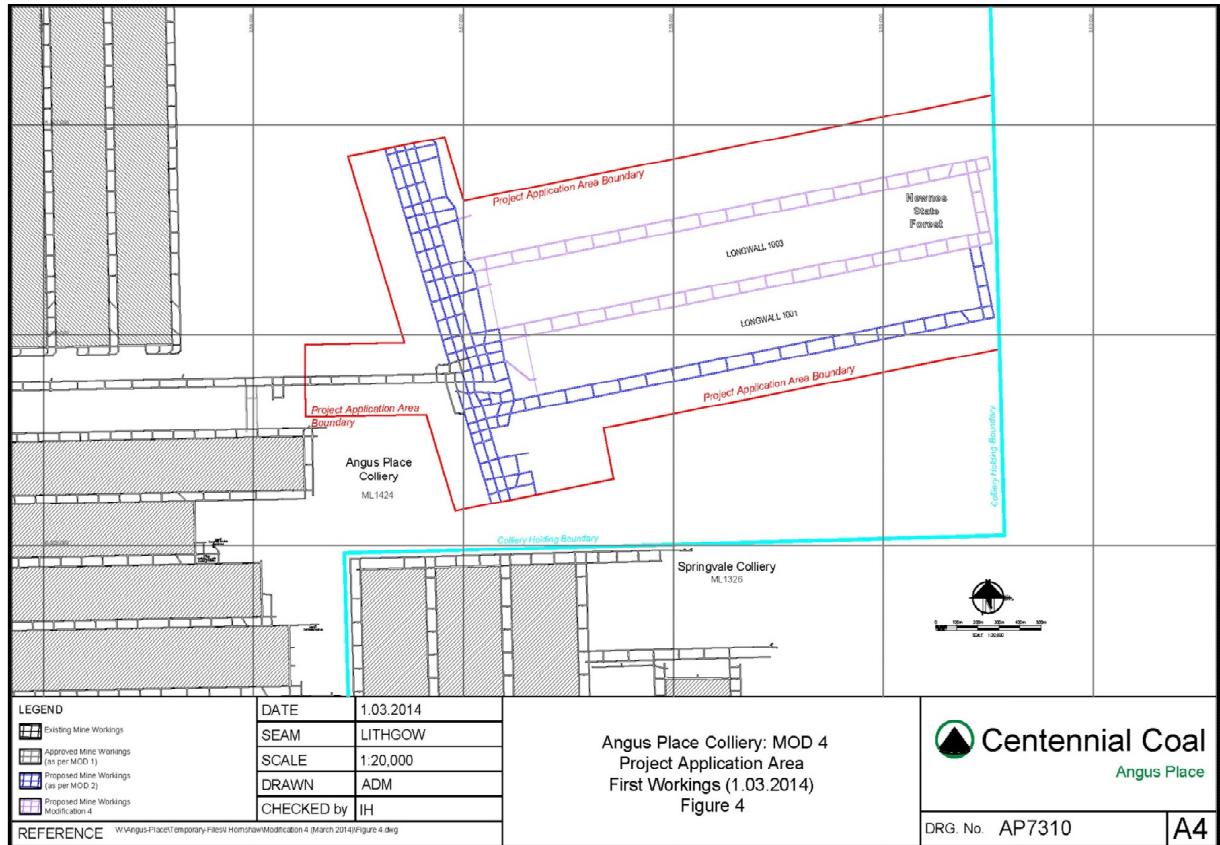


Figure 4: Approved and proposed first workings in the extension area

3. STATUTORY CONTEXT

Modification

Following the repeal of Part 3A of the *Environmental Planning & Assessment Act 1979* (EP&A Act), the mine is classified as a 'transitional Part 3A project', under Schedule 6A of the Act. The proposed modification must therefore be considered under section 75W of the EP&A Act, despite its repeal.

The Department is satisfied that the proposed modification is within the scope of section 75W. The Department notes that the nature and extent of the proposal is minor, and would not change the general operations of the mine, not change approved mining methods, not increase the annual 4 Mtpa extraction limit and not change the mine's processing or transportation activities.

Approval Authority

Under section 75W of the EP&A Act, the Minister for Planning is the approval authority for the modification application. However, under the Minister's delegation of 14 September 2011, the modification application must be determined by the Planning Assessment Commission (PAC), as more than 25 objections from members of the public were received.

Exhibition and Notification

The Department:

- publicly exhibited the application and EA from 26 May to 10 June 2014 at the:

- Department's Information Centre;
- Lithgow City Council's offices and Wallerawang Branch Library; and
- Nature Conservation Council's offices;
- advertised the exhibition in the Lithgow Mercury; and
- notified relevant State Government authorities and the Council of the exhibition in writing.

4. SUBMISSIONS

The Department received 296 submissions on the proposed modification, including seven from Government agencies, five from special interest groups and 284 from individual community members (see **Appendix B**). None of the Government agencies objected to the proposed modification, but some raised concerns regarding potential environmental impacts. Agencies made recommendations to limit potential environmental impacts. All special interest groups (bar one) and the great majority of individual community submissions (bar 15) objected to the proposal.

4.1 Summary of Submissions

Government Agencies

Environment Protection Authority (EPA) was concerned with increased water make at the mine and how this water would be managed.

Office of Environment and Heritage considered that the proposed modification should be assessed as part of SSD 5602. OEH also raised concerns that the proposed mining could result in fracturing of a drainage line which feeds Carne Creek.

Division of Resources and Energy supported the application, since no significant subsidence or other impacts would be likely and it would allow continuity of underground development at the mine.

NSW Office of Water was satisfied that no significant impacts would occur to swamps and other groundwater dependent ecosystems. It requested to be consulted if any expansion of the groundwater monitoring program is undertaken, and for it to be provided with the results of water modelling reviews to confirm water-take predictions.

Fisheries NSW recommended regular monitoring of surface water features such as the Wolgan River and Carne Creek, stating that it should be notified if monitoring detects significant impacts to fish habitat.

Sydney Catchment Authority did not object, as the subject area lies outside of the SCA drinking water catchment boundary.

Lithgow City Council also did not object, however it recommended that the mine's Section 94 contributions are updated, and that the approval condition relating to the Community Enhancement Fund should be modified to allow it to operate as intended.

Special Interest Groups

Colong Foundation for Wilderness opposed the modification and commented that the:

- proposed first workings define the longwall panel widths for the first two panels of the Extension Project;
- these first workings are not crucial for continuity of operations at the mine; and
- approval of this modification effectively locks in the position of regulatory authorities in terms of the intensity of mining in the first two longwall panels of the Extension Project, and pre-empts subsequent limitations of mine subsidence impacts on surface features as later changes to the width of these two panels would not be possible.

Blue Mountains Conservation Society noted the Department's previous position regarding similar first workings approved under MOD 2. It also criticized the justification of the proposed modification, stating that Centennial is seeking to gain tactical advantage in terms of the assessment of its Extension Project. The Society also commented on the high conservation value of the swamp systems above the mine, which it believes should be avoided.

Stop CSG Blue Mountains raised concerns similar to those included in the form letters received by the Department (see below).

Earth Recovery Australia commented on the high conservation value of the area. It also commented that the application should be deferred until the PAC has determined the Extension Project.

Construction, Forestry, Mining and Energy Union supported the application, highlighting that coal mining has a long history in the region, and noting the efforts Centennial has made to limit the impacts of its operations.

Community Submissions

Of the 284 community submissions, 269 were objections, 12 were in support, and 3 made comments.

Of the objections received, 90 submitters were generally opposed to coal mining, with many objecting to any further mining in the Western Coalfield. Some submitters commented on the conservation value of the wider region. Key comments relevant to Angus Place in these submissions included that the:

- mine is located on the Newnes Plateau, which has high-value ecological attributes, including significant swamp features which require protection from mining impacts;
- mine poses a threat to the region's water quality and quantity, including impacts to the Wolgan River and Carne Creek;
- mine is near the Gardens of Stone National Park; and
- natural heritage of the Angus Place project area is under further threat of impacts;

The remaining 179 objections were form letters which raised the following main concerns/comments:

- the proposed modification should be refused, or its determination deferred, until the Extension Project is determined by the PAC;
- the small amount of proposed mining is not needed for continuity of operations at Angus Place, and it pre-empts decision making for the Extension Project;
- the proposed first workings indicate future longwall panels which are wider than those previously approved, which will lead to increased impacts to sensitive water catchments; and
- Centennial is attempting to 'lock in' the position of regulatory authorities regarding potential subsidence impacts to Carne Creek before the PAC has assessed and determined the matter.

The 12 supporting submissions indicated that the mine:

- is a significant employer in the local area; and
- provides a significant benefit in terms of supporting local electricity generation.

The three submissions making comments highlighted the significance of the Gardens of Stone National Park as a tourist attraction and that renewable energy sources should be promoted ahead of coal.

Response to Submissions

Centennial provided a Response to Submissions (RTS) document on 1 July 2014 (see **Appendix C**). The Department forwarded the RTS to Government agencies and made it publicly available on its website. No agencies raised any residual issues in response to the RTS.

5. ASSESSMENT

The Department considers that the principal issues requiring assessment are:

- strategic assessment considerations (ie whether the modification pre-empts the assessment of SSD 5602);
- potential subsidence impacts to natural features;
- surface water and groundwater impacts; and
- flora and fauna impacts.

5.1 Strategic Assessment

The Department recognises the significant level of community opposition to this modification, and the comments in submissions that:

- the modification would effectively set the dimensions of two future longwall panels;
- if the modification is approved, then the position of regulatory authorities is 'locked in' with regard to SSD 5602; and
- the application is an abuse of process, as it pre-empts the assessment of SSD 5602.

The Department understands the position adopted by members of the community and special interest groups on these issues and the concerns that they reflect. Each of these positions deserves detailed consideration. The Department's assessment is set out below.

The most important issue is whether approval of the modification would effectively set the dimensions of the first two longwall panels in the Extension Project (LW 1001 and 1003). The Department agrees with this position, and clearly said so in its previous assessment of MOD 2, as follows:

"As can be seen, parts of the originally proposed trial mining (in particular the [originally proposed up to] 5 sets of easterly twin headings) have the potential to establish a mining layout for four longwalls that could then become part of the proposed Angus Place Extension Project...."

As a consequence, the Department recommended restricted first workings for MOD 2, most of which are shown in royal blue on **Figure 2**. Driving this one set of tailgate roadways and installation roadways would not in itself determine the width of the first longwall. In determining the application, the PAC agreed that the extent of the first workings originally applied for by Centennial in MOD 2 could determine the broad dimensions of up to 4 future longwall panels, and approved the reduced first workings recommended by the Department.

However, there is a crucial difference between MOD 2 and MOD 4. MOD 2 was not accompanied by a subsidence assessment which considered the impacts and consequences of extracting the longwall blocks which would be defined by the proposed gateroads. However, at the Department's request, MOD 4 does include such an assessment.

The Department's view was that the assessment of the modification could only be undertaken if the predicted impacts associated with subsidence of the two longwall blocks were also carefully taken into account. The Department therefore requested Centennial to provide an assessment of the environmental impacts associated with the first workings *and* the extraction of the two longwall panels, despite secondary extraction not being proposed under this application. Thus, all potential impacts associated with the delineation of the first two longwall blocks are addressed in Centennial's EA.

Other examples also exist of this approach to ensuring mine continuity in the face of large development applications also being on-foot. For the NRE No 1 Colliery (now Russell Vale Colliery) the PAC approved MOD 1, which permitted the extraction of Longwalls 4 and 5 and the development of Longwall 6. The Department is now assessing MOD 2 for that colliery, which would permit the partial extraction of Longwall 6. Both MOD 1 and MOD 2 are smaller elements of the mine's Underground Expansion Project application, the assessment of which has been delayed by requests for further information.

Further, it must be noted that the proposed additional first workings would not 'set in stone' the final dimensions of either LW 1001 and 1003. A number of mechanisms would remain available to restrict subsidence impacts on overlying surface features. Assessment of SSD 5602 could lead to any of the following options being recommended by the Department or decided by the PAC (which also must determine SSD 5602, as well as MOD 4). These include:

- refusal of the development application;
- approval of the application subject to strict performance measures;
- approval of the application subject to an altered longwall layout;
- approval of the application subject to LW 1001 and/or 1003 either being not permitted to commence or finish to the full extent of the MOD 4 layout (ie being required to drive new installation roadways or to 'pull up short' from the proposed finishing line); or
- approval of the application subject to narrower longwall panel widths for LW 1001 and/or 1003, requiring new gateroads to be installed, probably to 'split' the proposed MOD 4 panel width.

While this variety of options would remain open in assessing and determining SSD 5602, nonetheless the Department considers that the current assessment of MOD 4 should aim for the 'right' outcome, and not require some future 'correction' as a result of consideration of the subsidence assessment accompanying SSD 5602. It is for this reason that the Department sought and obtained the subsidence assessment of second workings that might result from MOD 4's proposed longwall layout.

It also should be noted that approval of MOD 4 would not remove in any way the responsibility to undertake a thorough merit assessment of the impacts of SSD 5602, including all proposed longwall extraction and subsequent subsidence impacts. This is particularly the case since MOD 4 only seeks approval for the proposed first workings, and not for the associated longwall extraction.

For these reasons, the Department does not accept that approval of MOD 4 would unduly influence its assessment or the PAC's determination of the Extension Project.

For the same reasons, the Department does not consider that the positions of regulatory authorities are 'locked in' in terms of assessing the subsidence impacts of SSD 5602. The Department is confident that agency positions on the scale and acceptability of impacts of future longwall mining would not be settled or unduly influenced if MOD 4 was to be approved.

The Department also does not agree that the application is 'an abuse of process'. Under the EP&A Act, Centennial has the right to submit the modification application and have it assessed on its merits. In fact, Centennial has accepted that submitting the modification application carries a significant commercial risk. That is, if its Extension Project is not approved, or it is approved with varied longwall layout, widths or lengths; then Centennial would lose the very significant amounts of money invested in construction of the longwall roadways under the proposed modification. This is because the cost of driving gateroads to allow extraction of longwall panels is very much a loss-making activity. All longwall mines are loss-making enterprises whenever the longwall machine is standing idle, unable to cut coal. These 'sunk costs' are only recovered (and a profit made) during actual extraction of the longwall blocks. If the roadways had to be re-driven, then there would be substantial extra costs involved, as well as the delay before the first longwall block could be extracted.

5.2 Subsidence

The proposed modification would expand the development of roadways which were approved under MOD 2. Such roadways are examples of what are termed 'first workings' in underground coal mining. First workings are limited in size (generally roadways of up to 5.5 metres (m) in width and height, or else the height of the seam being worked, particularly in the case of bord and pillar mining). They are designed to be long-term safe and stable, particularly in longwall mines, since the primary purpose of these workings is to provide access for personnel and plant to areas of secondary extraction, ie the longwall panels. As a result, first workings generally do not result in measurable subsidence impacts at the surface. 'Measurable' subsidence impacts are considered to be 20 millimetres (mm) or more, since this is the usual limit of survey accuracy over significant distances on open ground when other cases of survey interference (such as soil swelling) are taken into account.

The Department therefore considers that subsidence impacts from the proposed first workings are very unlikely to result in any observable subsidence impacts at the surface or in environmental consequences which require any form of mitigation.

However, to ensure that the potential subsidence impacts and environmental consequences of potential future extraction of LW 1001 and LW 1003 were adequately taken into account, the Department requested that Centennial provide a subsidence assessment of longwall extraction. Consequently, a detailed subsidence assessment (SA) was prepared by Mine Subsidence Engineering Consultants (MSEC) for Centennial and included in the EA. The assessment considered the impacts of first and second workings within the surface area defined by the 26.5 degree 'angle of draw' (AOD) line from the extents of the proposed longwall panels, and the predicted limit of vertical subsidence (ie the 20 mm subsidence contour).

Mining Geometry

The dimensions of the proposed longwall panels are shown in Table 1:

Table 1: Panel dimensions

Longwall panel	Void length (including headings)	Void width (includes first workings)	Tailgate chain pillar width
1001	2,160 m	295 m	-
1003	2,340 m	295 m	55 m

Void widths in Table 1 include the two roadways which define the longwall panel, and the actual longwall panel width would be 10 m less. The depths of cover from the surface to the roof of the extracted seam range from 315 - 415 m, but are typically in the range of 350 - 400 m. Width to depth ratios are between 0.75 - 0.85, which are similar to the longwall panels previously extracted at the mine. The maximum extraction height of the coal seam is 3.15 m. This panel design means the panels are not 'supercritical' in width (ie the mining height and depth of cover is less likely to result in irregular subsidence movements).

Subsidence Predictions

The key predicted subsidence parameters resulting from the extraction of both longwall panels are shown in **Table 2**. It should be noted that these values are maximum predictions, and actual subsidence would vary across the study area, due to variations in longwall geometry, varying depths of cover and extraction heights.

Table 2: Subsidence predictions (total)

After panel	Vertical subsidence (mm)	Tilt (mm/m)	Conventional tensile strains (mm/m)	Conventional compressive strains (mm/m)
1001	1000	7	1	2
1003	1350	10	1.5	2.5

Commonly, tensile and compressive strains are the key factor associated with surface impacts, particularly surface cracking. Tensile and compressive strains will vary across the proposed longwalls, with greater strains occurring in the base of streams, due to the shallower depths of cover and valley related movements, and smaller strains occurring along the plateaus, due to the higher depths of cover. Elevated tensile strains may also occur at the top of steep slopes, or on those slopes.

Subsidence Impacts on Cliffs, Pagodas and Steep Slopes

The mining layout has been designed such that the majority of the cliffs and pagoda complexes¹ are located outside the AOD of the proposed longwalls (see **Figure 5**). No cliffs, minor cliffs, or pagoda complexes are located within the footprint of the proposed longwall panels. Only one small cliff (AP-CL1) and some small pagoda complexes are located within the AOD (see **Figure 5**), and a number of isolated pagodas are located above the longwalls. There are a substantial number of steep slopes over the two proposed longwall panels and within the study area, primarily associated with the valley of the 2nd order Drainage Line 1 (see **Figures 5** and **6**). Both panels are also located a substantial distance from the Gardens of Stone National Park (around 4.6 km).

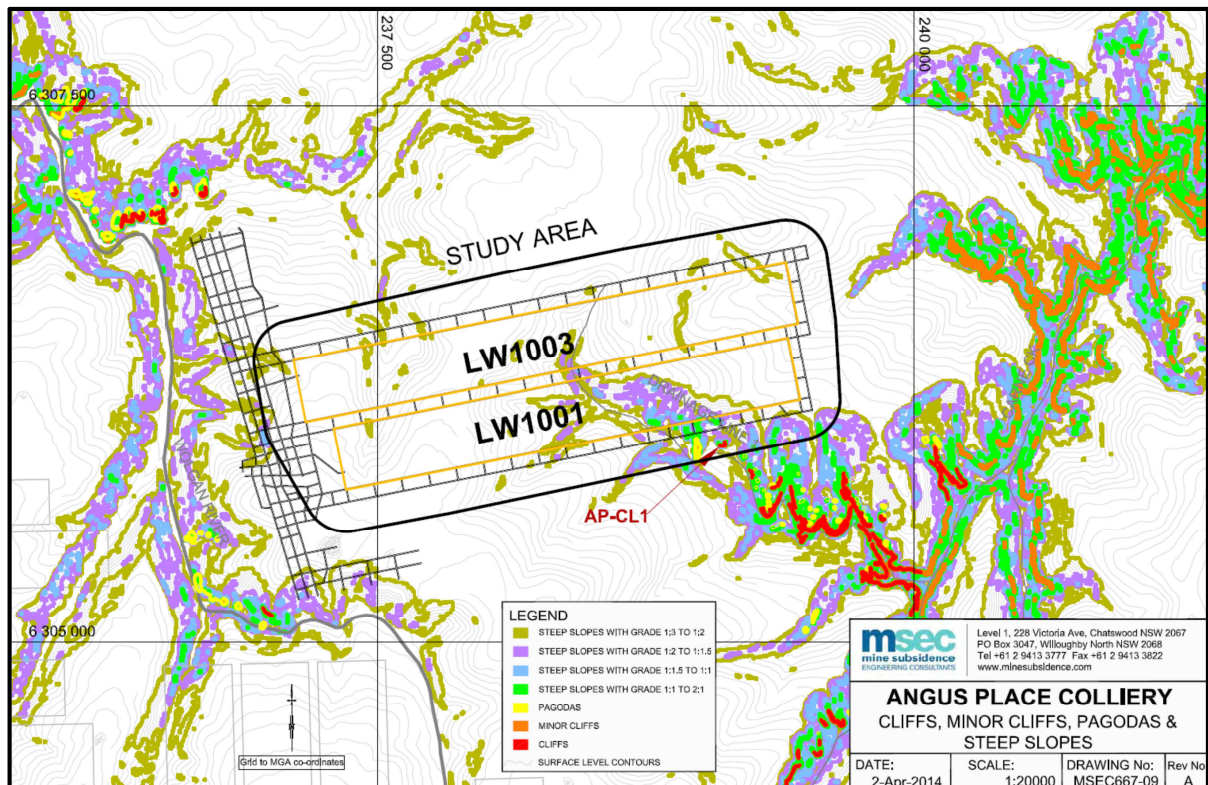


Figure 5: Cliffs, steep slopes and rock formations

The proposed first workings are unlikely to result in any impact on cliffs, pagodas or steep slopes. In the case of second workings, conventional subsidence predictions at the cliff and small pagoda complex within the AOD are relatively low (ie <50 mm). Compressive strains (which can cause

¹ A pagoda is defined within the SA as an isolated freestanding rock formation with a height greater than 5 m.

impacts to these types of features), are also predicted to be very low (ie up to 0.5 mm/m). The depth of cover to the longwall panels also has an influence on the level of impact, which the SA indicates is supported by empirical evidence in NSW showing that no cliff instability has been observed where cliffs are located outside the footprint of the longwall panel where the depth of cover is greater than 200 m.

The isolated pagodas located directly above the longwall panels could experience some minor fracturing. However, the discontinuous nature of these features makes them less likely to be subject to elevated impacts, when compared to cliffs. The SA predicts that only 1% of the total surface area of any pagoda located directly above the longwall panel would be impacted. The SA concluded that even if the subsidence movements were to exceed predictions by a factor of two, impacts to > 3% of the surface area of any pagoda would still be unlikely.

As **Figure 5** shows, most steep slopes in the study area have slopes in the range of 1 in 3 to 1 in 1.5. Maximum subsidence levels of 1,350 mm are predicted for steep slopes in the study area. However, the maximum predicted tilt of 10 mm/m for LW 1003 (or 7mm/m for LW 1001) is comparatively small in the context of the grade of the slopes, and this level of tilt is unlikely to result in significant impacts. The steep slopes would be more likely to be affected by ground strains, which could result in the formation of tension cracks on the top and sides of the slopes and tension ridges forming at the bottom. Such impacts have occurred previously at Angus Place, with tension cracks around 50 mm wide and 10 m long on the western side of Narrow Swamp, above LW920. These cracks were naturally infilled in the months following their development. If tension cracks were to eventuate from the extraction of the two longwall panels, remediation using general construction techniques (ie infilling with inert materials) could be required to prevent increased soil erosion.

Subsidence Impacts on Swamps and Watercourses

Two swamp types are prevalent in the local area - the *Newnes Plateau Shrub Swamp* and the *Newnes Plateau Hanging Swamp* (see **Figure 6**). No areas of shrub swamp occur in the study area, however a number of significant shrub swamps occur in the surrounding area, including Tri-Star Swamp (225 m north of LW 1003), Sunnyside Swamp (550 south of LW 1001) and an unnamed shrub swamp on an unnamed drainage line which joins Carne Creek (190 m east of LW 1003).

Centennial has had significant experience in undermining swamp systems. Angus Place and the neighbouring Springvale Colliery have together directly or partially undermined 13 shrub swamps and 26 hanging swamps. Surface impacts have been observed at four of these swamps (Narrow Swamp North, Narrow Swamp South, East Wolgan Swamp and Junction Swamp).

An independent investigation undertaken on behalf of the then Commonwealth Department of, Environment, Water, Heritage and the Arts found that the major cause of most of the impacts at Narrow Swamp North and Narrow Swamp South was minewater discharge and not subsidence-related ground movements. Impacts at East Wolgan Swamp and Junction Swamp appear to have been caused by a combination of subsidence-related ground movements, minewater discharge and erosion, with the particular contribution of subsidence impacts unable to be quantified.

Hanging swamps are reliant on groundwater seepage from perched aquifers, run-off and rainfall. The layout of LW1001 shows the western end of the panel stopping partway beneath a hanging swamp, but with only a small section of this swamp (a drainage channel located upslope of the main body of the swamp) directly undermined. Notably, a further five hanging swamps located within the study area would not be undermined by second workings.

The subsidence predictions for the shrub swamps are <20 mm conventional subsidence, <0.5 mm/m tilt and 1 mm/m of tensile and compressive strains. According to MSEC, these subsidence levels are very unlikely to result in fracturing and draining of the shallow aquifers which feed the swamps and resulting impacts are unlikely to be anything above negligible.

However, the small section of hanging swamp over LW 1001 is predicted to experience around 900 mm of subsidence, 3 mm/m of tilt, and 1 mm/m of tensile and compressive strains. This small section of swamp may be subject to minor erosion, ponding or surface cracking.

Centennial records shallow groundwater levels in seven swamps (including East Wolgan Swamp, Narrow Swamp North, Narrow Swamp South and Tri-Star Swamp) on a daily basis, and would continue this monitoring program under the proposed modification and during longwall mining.

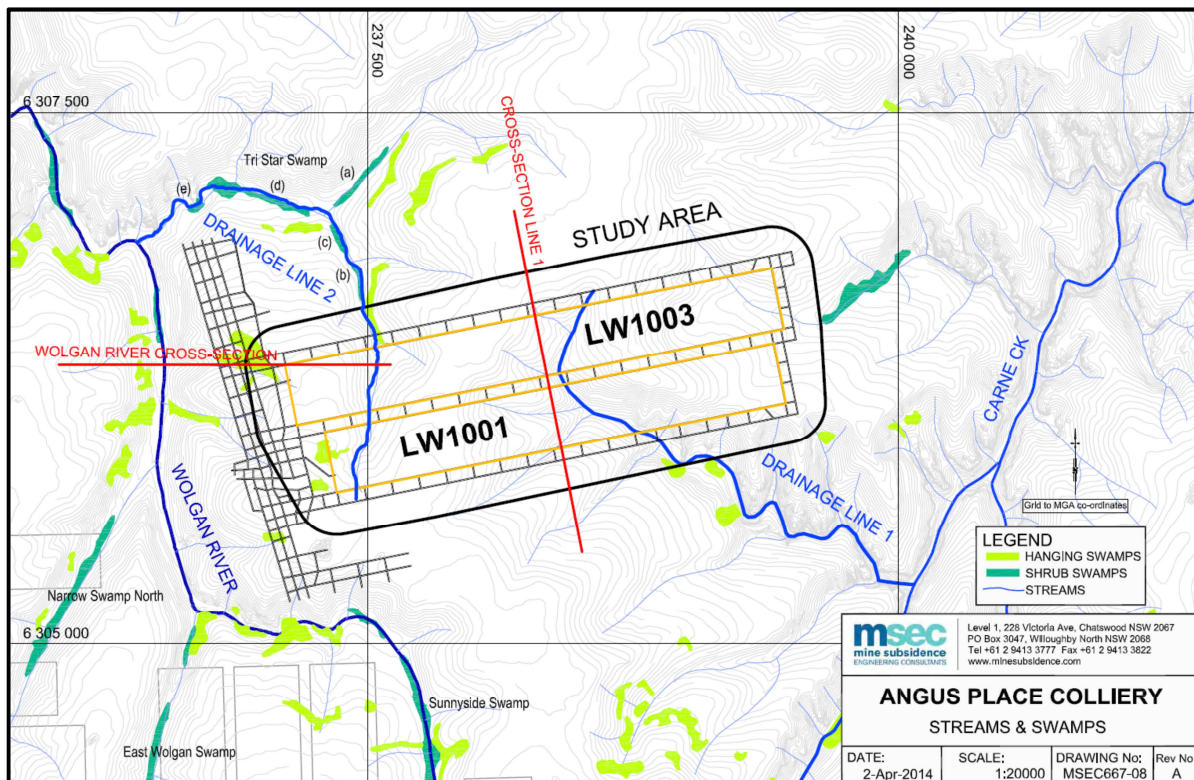


Figure 6: Streams and swamps

Carne Creek and Wolgan River are located near the study area (also see **Figure 6**). The Wolgan River is a perennial stream which derives a small amount of its base flow from shallow aquifers. Carne Creek is the main tributary of the Wolgan River in its upper section. Impacts to the stability and flow capability of these watercourses from extraction of the two longwall panels would be unlikely to be greater than negligible. The Wolgan River is over 0.5 km and Carne Creek is around 900 m from the longwall panels, both well outside the AOD. The maximum predicted subsidence for Wolgan River is <20 mm, with predicted tilts likely to result in a change in grade of only 0.1%; and no measureable subsidence or valley-related movements are expected at Carne Creek.

However, two 2nd order tributaries associated with these streams would be directly undermined. Drainage Line 1 joins Carne Creek southeast of the study area, and Drainage line 2 joins the Wolgan River to the north. Both tributaries are ephemeral for the majority of their lengths, and therefore do not contribute significant baseflows to the watercourses that they join.

The tributaries are predicted to experience maximum subsidence movements from second workings, where they cross the central sections of the longwall panels. Predicted tilts would result in a change of grade of around 1%, which in context is less than the natural gradient. Any increase in ponding would be localised, and not be expected to affect the operation of the tributary. Tensile and compressive strains (including valley closure) throughout the overall lengths of the tributaries are predicted to be minor at worst, however localised compressive strains in sections of the drainage lines above the centres of the panels may result in bedrock fracturing and temporary sub-surface flows.

MSEC states that any bedrock fracturing is likely to only be shallow (ie 10 – 15 m), and as the drainage lines are generally ephemeral it would only be in times of low flow when flow would divert into these fractures. Resulting impacts to the quality and quantity of the water flowing in the drainage lines would be localised and not affect the overall quantity and quality of water in catchment flows. In times of heavy rainfall, the majority of the runoff would flow over the stream bed and would not be diverted into the fractured strata below.

Subsidence Impacts on Built Features

Built features in the study area include unsealed roads, fences, and mine services infrastructure. First workings development is unlikely to impact any of these built features. Second workings may result in subsidence levels at built features up to the maximum levels shown in Table 2. However all built

features would be expected to be maintained in a safe and serviceable condition. Appropriate management strategies would be developed to manage any impacts at these built features.

Subsidence Monitoring

Centennial has an extensive subsidence monitoring program which would continue to apply during the proposed longwall mining. The program measures maximum vertical subsidence, tilts and strains induced by previous and current mining, and includes ground surveys along representative subsidence monitoring lines. Revisions to the monitoring program would be undertaken as necessary in response to recorded subsidence levels.

Conclusion

The proposed first workings the subject of the modification are very unlikely to result in any observable subsidence impacts at the surface or in environmental consequences which require any form of mitigation.

In respect of the second workings for LW 1001 and LW 1003 which may potentially be approved under SSD 5602, the Department notes that:

- the majority of nearby cliffs and pagoda complexes are located outside the AOD of the proposed longwall panels. The small cliff and pagoda complexes which are within the AOD are outside of the longwall footprints, and minimal subsidence effects and impacts are predicted to result at these features;
- some fracturing of directly undermined individual pagodas above the longwalls may result, however this is predicted to only affect around 1% of the surface of any pagoda;
- the steep slopes above the longwall panels would experience the full range of subsidence impacts, and based on previous experience at the mine, tension cracks may result and may require some minor remediation (ie infilling);
- only a small amount of swamp vegetation would be directly undermined, with no significant swamp features overlying the longwall footprint, and any impacts to swamps are predicted to be minor at worst; and
- local geology and significant depth of cover to the mining area would act to minimise the risk of significant impacts to the two 2nd order watercourses overlying the two longwall panels.

The two proposed longwalls have been positioned to avoid all cliffs and pagoda complexes and to have only limited impacts on one small swamp. The two most significant natural features above the proposed longwalls are two small, ephemeral 2nd order streams. No major environmental consequences are expected to result from extraction of either longwall.

5.3 Surface Water and Groundwater

Groundwater

Mining-induced groundwater impacts are likely to be limited in scale, as the thick and impermeable Mt York Claystone provides a strong barrier to groundwater percolation (see **Figure 7**).

Centennial predicts a worst-case additional inflow rate of 0.73 megalitres/day (ML/day) from the proposed first workings. However this prediction is based on mining occurring at shallower depths of cover and is therefore a conservative estimate.

Up to an additional 4.9 ML/day of groundwater inflows could report to the mine from the extraction of the two longwall panels. However this figure would be largely offset by the significant decrease in inflows which is expected to result from mining moving from the existing operations to the proposed Extension Project. Additional inflows would be managed through existing water management systems, including underground storage, discharge to Kangaroo Creek under licence and transfer via the established Water Transfer Scheme (WTS) to the Wallerawang Power Station for consumptive use.

Surface Water Management

Centennial considers the worst-case additional inflows of 0.73 ML/day from the proposed first workings are not significant, in the context that it is currently required to manage around 13 ML/day from the mine. The Department considers that the additional 0.73 ML/day inflow rate is unlikely to be reached, and that this figure may also incorporate some of the predicted inflows from the first workings approved under MOD 2.

The majority of water make at the mine is transferred via the WTS, which currently handles approximately 23 ML/day in total from Angus Place and Springvale, in accordance with the Environmental Protection Licence (EPL) for the WTS. Approximately 1 ML/day is discharged from the mine to nearby Kangaroo Creek, which is well within the mine's EPL discharge limit of 2 ML/day.

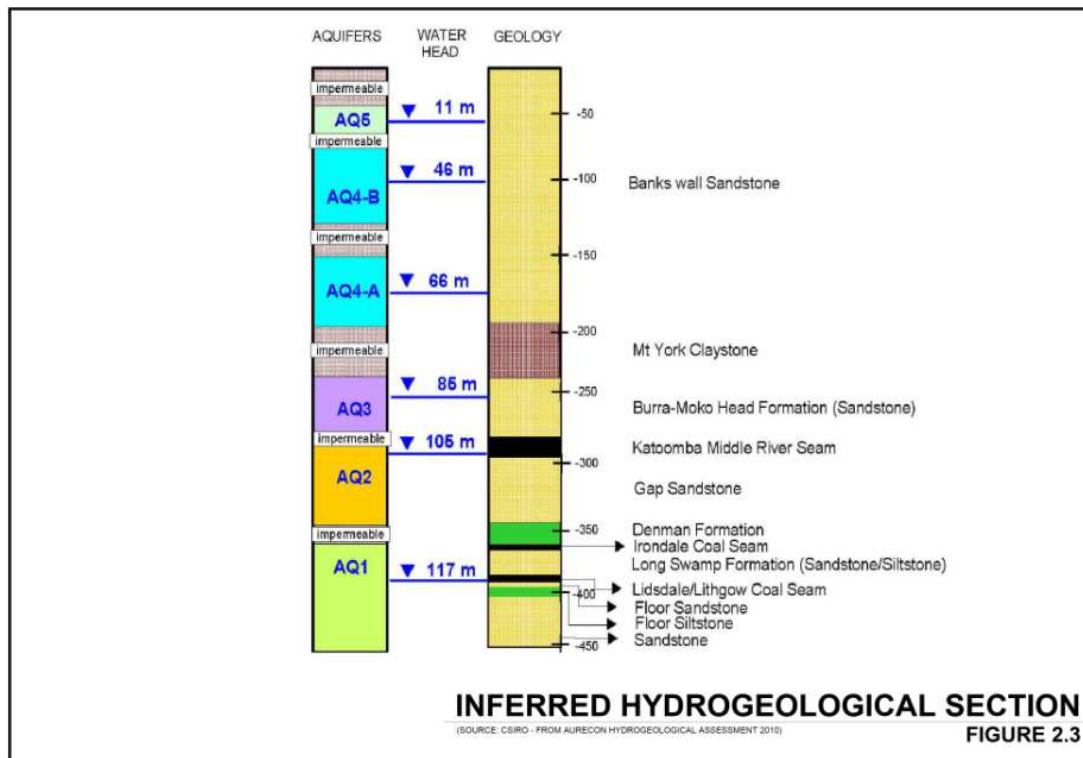


Figure 7: Regional geology and groundwater resources

EPA raised concerns about the capacity of the WTS. However, it recognised that overall water management from the mine is an issue which would receive strategic attention through the assessment of SSD 5602. EPA also reported that Centennial is consulting it closely to formulate a strategic response to long-term water management for its Western Coalfield operations.

Water quality in the Cocks River (where most of the Angus Place inflows would ultimately report) is generally consistent with 'fair' drinking water quality standards, with elevated conductivity (ie salinity) recorded in Kangaroo Creek due to the current minewater discharge. The proposed modification would be unlikely to significantly affect the current quality of receiving waters. The additional 4.9 ML/day of inflows from second workings would require careful management, however the Department notes that the total mine water make, including inflows from the proposed second workings, would remain within the discharge limits set under the WTS's EPL. The Department concurs with EPA that water management requires holistic attention, which would be addressed through a rigorous assessment of surface water impacts for the entire mine site under SSD 5602.

Centennial undertakes regular water quality monitoring at Kangaroo Creek and the Wolgan River, which would continue under the proposed modification and during the proposed longwall mining. It is also required under current approval conditions to review, and if necessary revise, its Water Management Plan following any approval of the modification. On this basis, the Department considers that no additional conditions of approval are required to manage water management impacts from the proposed modification.

5.4 Ecology

Flora

The proposed modification would not require any vegetation to be cleared. No measureable surface impacts are expected to result from the proposed first workings, and consequently any impacts to flora species, populations or communities would be most unlikely.

Hanging swamps are associated with perched aquifer systems, rather than regional water tables. These swamps are heavily reliant on rainfall recharge, and subsidence from second workings is unlikely to have any major influence on the storage capacity of these swamp systems.

Fauna

While recent surveys show a total of 49 fauna species recorded in the study area, including five threatened fauna species, the proposed first workings would not impact on the habitat of any species. It is also highly unlikely that subsidence from second workings would affect woodland or forest habitats such that they would become in any way unsuitable for any of the fauna recorded or having the potential to occur in the study area. No observable impacts to these habitats relating to mine subsidence have been recorded at the mine to date.

The current conditions of approval require the approved Flora and Fauna Management Plan to be reviewed, and if necessary revised, following any approval of the modification. The Department considers that no additional conditions of approval are required to manage potential flora and fauna impacts.

5.5 Other Issues

The Department has considered other issues relevant to the proposed modification, and has summarised its assessment of these issues in **Table 3**.

Table 3 – Other Issues

Issue	Assessment	Conclusion and Recommendation
<i>Socio-Economic</i>	Centennial has to date invested \$63 million to develop the first workings adjacent to LW 1001. Centennial states that, if the development of first workings was to cease now, it could lead to it standing down a significant portion of its workforce. Further, if first workings are not continued, then there would be a significant hiatus before they could be recommenced under any future approval for SSD 5602. This hiatus would lead to substantial additional costs for Centennial, causing the mine to run at a loss for a significant length of time. These costs include up to 20% of the mine's workforce being unoccupied until first workings development recommences, and a further 20% of the workforce not being required while longwall extraction is not underway or in changeover. The Department notes that Centennial received approval in August 2011 to develop and extract two longwalls (LW900W and LW 910), of which only the first is currently being extracted. LW 910 lies immediately north of LW 920 (see Figures 2 and 4). However, the Department understands that this is not a currently-available resource. This is because LW 910 can only be extracted 'on retreat' (ie after completion of extraction in the Extension Project), since its main gates are to be used as access roadways to the extension area. If the panel was extracted and collapsed, then it would clearly prevent access to the extension area via this location.	The Department accepts that it is an intrinsic part of the economics of a longwall coal mine to maintain sufficient 'development float' of first workings in advance of the longwall machine, which cuts a longwall panel much more quickly than the pace at which longwall development roadways can be established. It considers that there is substantial merit in providing for continuity of mine development and reducing the risk of standing down mineworkers. No additional conditions are required to manage socio-economic impacts.
<i>Section 94 Contributions</i>	Centennial is required to make Section 94 contributions to Lithgow City Council in respect of impacts to local services. Centennial argued that the application should not attract additional Section 94 contributions, stating that the proposed modification has no additional capital investment, and would not increase the demand for local services.	The Department considers this issue is best addressed in the assessment of SSD 5602. No change to existing conditions is appropriate.
<i>Community Enhancement Fund (CEF)</i>	The CEF is operated by Centennial, in consultation with Council and the mine's Community Consultative Committee (CCC). To date, no agreement has been reached as to how monies in the fund should be spent. Centennial has committed to raising this issue at the next CCC meeting in October.	The Department has recommended that the CEF condition is modified, to require funding proposals to be finalised by 31 January 2015, and that project(s) are commenced by 30 June 2015.

6. CONCLUSION

The Department has assessed the proposed modification in accordance with the requirements of the EP&A Act, including the objects of the Act.

The Department acknowledges objections from the community that, if this application is approved, it would pre-empt the position of the consent authority and other regulators in respect of the SSD 5602 application also currently under consideration. However, the Department does not agree with this position, since a significant number of options would remain available to adapt the dimensions of the two longwall panels to avoid or limit potential subsidence impacts. Further, Centennial has provided a detailed assessment of the potential impacts associated with subsidence caused by longwall extraction, which the Department has taken carefully into account.

The Department notes that Centennial is fully aware of the commercial risk attached to seeking the proposed modification; and that its justification for the proposed modification is to avoid any development continuity lapses and to provide continuity of employment for its workforce.

The Department is satisfied that subsidence from the proposed first workings would result in negligible impacts to built and natural features. The Department is also satisfied that the additional water make from the first workings is able to be accommodated within the existing water management system, and would be unlikely to significantly impact the current quality of receiving waters.

The Department has assessed the potential subsidence impacts of extracting the two longwall panels that would be delineated by the proposed first workings. This assessment shows that the environmental consequences associated with the predicted subsidence levels are unlikely to be greater than minor and are unlikely to require significant mitigation. Subsidence of the two proposed longwalls is predicted to have very limited effects on significant natural surface features including cliffs, pagodas and swamps. No major environmental consequences are expected to result from extraction of either longwall.

These conclusions would be further tested in assessment of SSD 5602. The Department notes that performance standards in the current conditions of approval require subsidence impacts to be limited to negligible limits at all natural surface features and that these standards would continue to apply while the assessment of SSD 5602 is undertaken.

The Department considers the proposal is in the public interest, due to its employment continuity and mining continuity benefits, and that it should be approved, subject to conditions.

7. RECOMMENDED CONDITIONS

Given the scale and nature of the first workings, the Department considers that the existing subsidence conditions of approval do not require strengthening. However the Department has recommended that the CEF condition is modified, to require expenditure from the fund to commence in the current financial year.

The Department has also taken the opportunity to make minor administrative amendments to the project approval, which mostly comprise updating government agency titles, but also include updating incident reporting timeframes, in line with other recent approvals of coal mining projects.

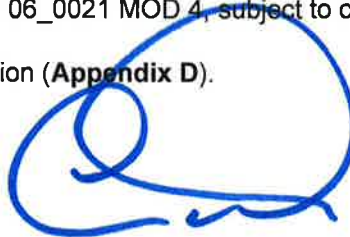
The Department has prepared a Notice of Modification (see **Appendix D**). These recommendations are reflected in an updated draft project approval (see **Appendix E**). The Notice of Modification was sent to Government agencies for comment. In response to OEH's comments on the Notice of Modification, Centennial has updated its proposed Statement of Commitments for the proposed modification. Centennial has accepted the recommended conditions.

8. RECOMMENDATION

It is RECOMMENDED that the Planning Assessment Commission exercise the powers and functions delegated to it in the Minister's Instrument of Delegation dated 14 September 2011, and:

- **consider** the findings and recommendations of this report;
- **determine** that the proposed modification is within the scope of section 75W of the EP&A Act;
- **approve** the modification application 06_0021 MOD 4, subject to conditions, under section 75W of the EP&A Act; and
- **sign** the attached notice of modification (**Appendix D**).


Howard Reed
Manager
Mining Projects 1.8.14

 27.8.14
Chris Wilson
Executive Director
Development Assessment Systems and Approvals

APPENDIX A: ENVIRONMENTAL ASSESSMENT

See attached CD.

APPENDIX B: SUBMISSIONS

Government Agency submissions follow. Special Interest Groups and Community submissions are on the attached CD.

APPENDIX C: RESPONSE TO SUBMISSIONS

APPENDIX D: NOTICE OF MODIFICATION

APPENDIX E: PROJECT APPROVAL 06_0021 AS PROPOSED TO BE MODIFIED
