ASSESSMENT REPORT

BULGA UNDERGROUND MINE
Blakefield North Modification (DA 376-8-2003 Mod 5)

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1 BACKGROUND

Bulga Coal Management Pty Ltd (Bulga) operates the Bulga Mining Complex located 12 kilometres (km) southwest of Singleton in the Hunter Valley (see **Figure 1**). The Complex includes the Bulga Underground Mine, the Bulga Open Cut Mine, a Coal Handling and Preparation Plant (CHPP) and rail loop.

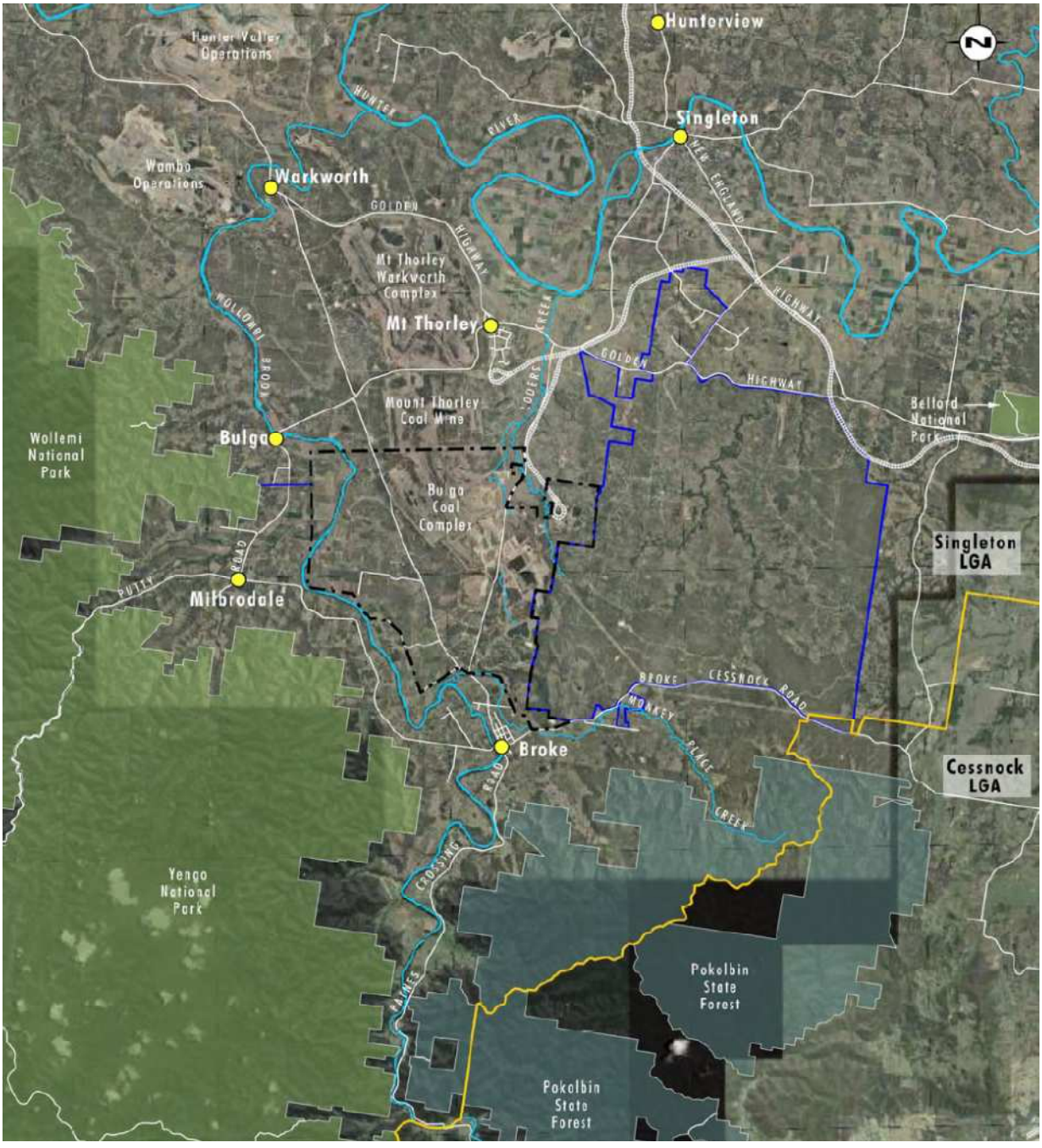


Figure 1 *- Locality map showing the Bulga Mining Complex*

The Complex is the southernmost mining operation in the Hunter Valley coal fields. The Mount Thorley – Warkworth Coal Complex lies immediately to the north, and the Singleton Military Training Area is immediately to the east. The nearest villages are Broke, about 3.5 km to the south; Milbrodale, about 3.5 km to the west; and Bulga, about 3.5 km to the northwest. The alluvial soils of the Wollombi Brook support a range of agricultural land uses to the west of the mine (see **Figure 2**).

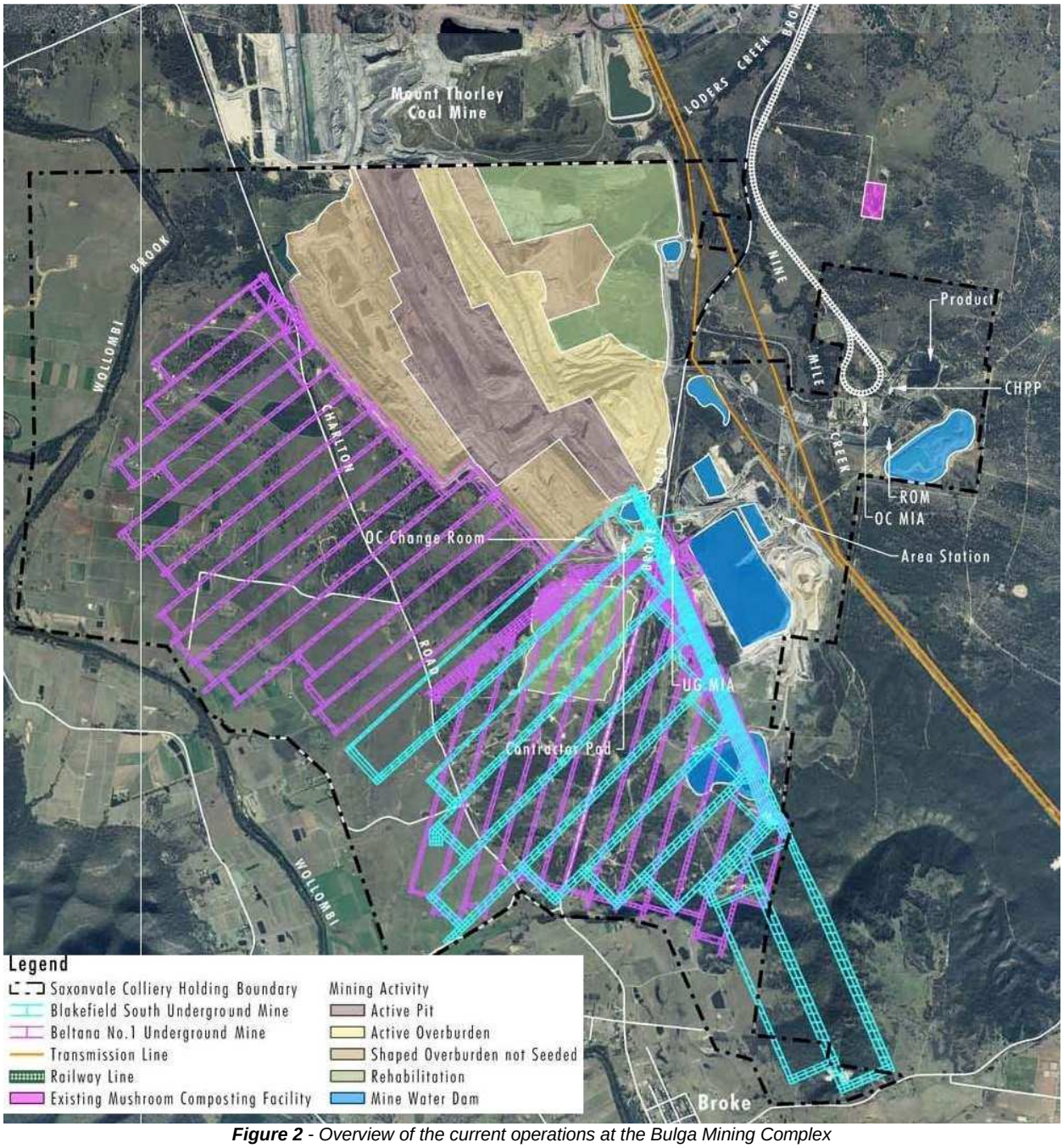


Figure 2 *- Overview of the current operations at the Bulga Mining Complex*

While operating under two consents, which separately govern the open cut and underground operations, Bulga manages the Complex as a single integrated mine. Bulga employs about 1,000 people and currently produces about 16 million tonnes per annum (Mtpa) of thermal and semi-soft coking coal. Product coal is shipped by rail 90 km to the Port of Newcastle, and thereafter exported primarily to Japan and China for energy production and steel making.

1.1 Underground Operations

The Bulga Underground Mine, CHPP and rail loop operate under Ministerial consent DA 376-8-2003, which was granted in February 2004 and consolidated all previous underground consents. Under this consent, Bulga may extract up to 14 Mtpa of run of mine (ROM) coal until 2031 using longwall methods, process 20 Mtpa of ROM coal in the CHPP and export up to

20 Mtpa of product coal using the rail loop. The consent has previously been modified 4 times, as follows:

- relocation of an access drift (Modification 1, 2006);
- increase ROM coal throughput at the CHPP to 20 Mtpa (Modification 2, 2006);
- extend and realign longwalls in the Blakefield South operation (Modification 3, 2007); and
- install mine-gas powered electricity generators of up to 25 megawatts (MW) capacity and trial ventilation air methane (VAM) abatement technology (Modification 4, 2010).

The Bulga Underground Mine comprises 7 individual mining operations across 4 target seams and is roughly divided into north and south mining areas. Only 3 of the 4 target seams are to be mined in the southern area. In this area, mining is complete in the Whybrow Seam ("South Bulga Mine"); presently occurs in the Blakefield Seam ("Blakefield South Mine"); and is approved for the Woodlands Hill Seam. In the northern area, mining is complete in the Whybrow Seam ("Beltana No 1 Mine"); and it is approved to occur in the Blakefield, Glen Munro and Woodlands Hill Seams.

1.2 Open Cut Operation

Bulga has recently lodged a development application and Environmental Impact Statement (EIS) for the Bulga Optimisation Project (SSD-4960). This application proposes a 10 year extension to open cut mining at the Bulga Mining Complex, with an additional 200 million tonnes of coal to be mined from deeper seams within the existing mine disturbance footprint. The EIS is currently under assessment.

2 PROPOSED MODIFICATION

The proposed modification to DA 376-8-2003 (Mod 5) is described in the Environmental Assessment (EA) attached at **Appendix B**. The proposed modification relates to the Blakefield Seam in the northern mining area, known as the Blakefield North Mine, and primarily involves:

- a layout of 7 x 400 metre (m) wide longwall panels instead of 12 x 265 m wide panels. The original consent approved panels that could range in width from 150 to 400 m. The proposed layout uses a newer, wider longwall miner that has been deployed in the Blakefield South Mine;
- development of main headings instead of access adits off the Whybrow Pit highwall. This is necessary to integrate the underground operation with the proposed Bulga Optimisation Project;
- additional gas drainage and ventilation infrastructure including between 6 and 20 gas drainage wells per longwall panel, 5 pre-mining gas flares, and 5 goaf gas flares;
- additional gas-fired electricity generators up to 32 MW capacity running on seam gas; and
- regularising the current underground workforce of 530 personnel.

Bulga proposes 2 options for access to the mine. The option initially selected for use will likely depend on progress of the Bulga Optimisation Project. It may also change over the mine life. The 2 options are:

- an access slot off the Whybrow Pit. The slot was approved in a recent modification to the open cut consent as it formed part of the proposal to mine seams below the Whybrow pit. Coal clearance would initially be in trucks, before a conveyor is installed between the slot and the CHPP. This proposal includes a pair of upcast and downcast ventilation fans above the slot; or
- continuation of the development headings from Longwall 9 in the Blakefield South Mine. This would be a minor extension of the development headings between the two mines. Coal clearance ventilation would be via the Blakefield South Mine. It may be necessary to install one or both of the ventilation fans closer to the Blakefield North Mine as per option 1 above.

The key components of the proposed modification are shown in **Figures 3 and 4**. There are no proposed changes to the maximum approved total ROM coal extraction or annual extraction rate.

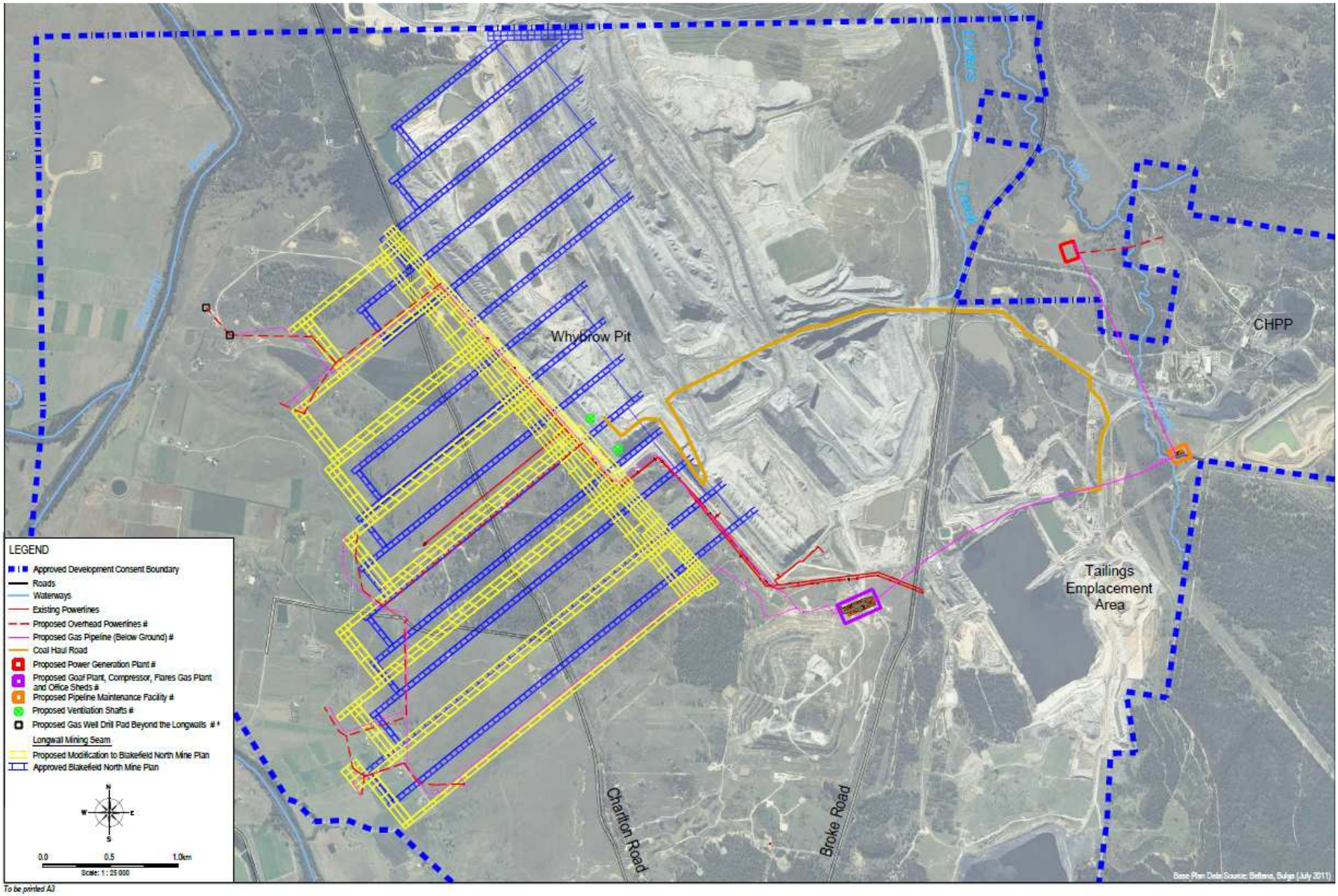
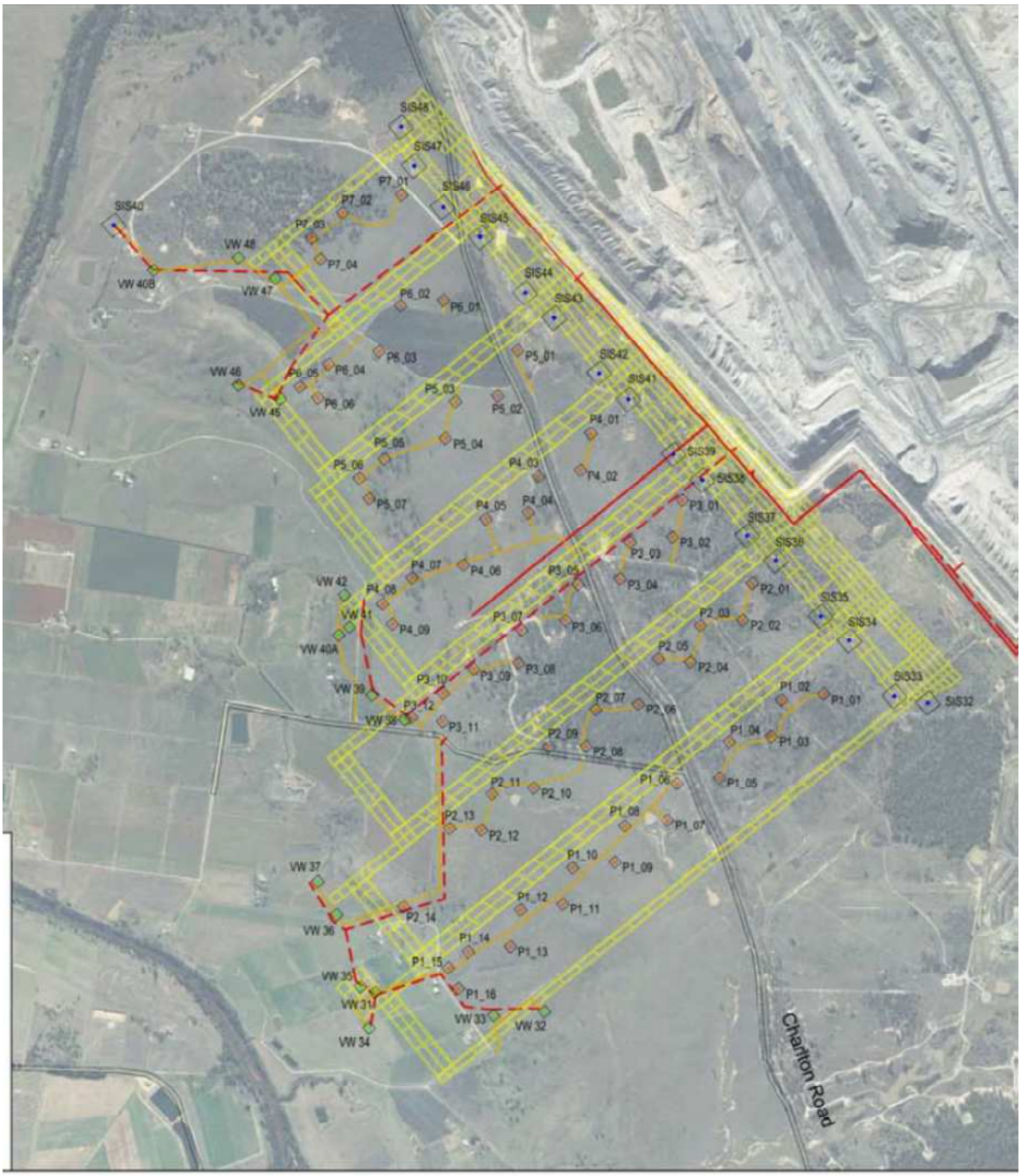


Figure 3 *- Proposed realignment of Blakefield North longwall panels and modified surface infrastructure (Access option 2 not shown)*



* Buried Pipelines Between Wells Not Shown

\# Indicative Locations will be finalised pending constraints

LEGEND

- Roads
- Proposed Modification to Blakefield North Mine Plan
- Typical Surface Road Network #
- SIS Angled Borehole - (Pre-Mining) #
- Vertical Wells - Pre-Mining # (Remains Post-Mining) #
- Goaf Wells (Post Mining) #
- Well Drill Pad #
- Existing Powerlines
- Proposed Overhead Powerlines #

0 400 800m

Figure 4 *– Conceptual gas drainage layout*

3 STATUTORY CONTEXT

3.1 Modification

DA 376-8-2003 was granted in 2004, under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Clause 8J(8) of the *Environmental Planning and Assessment Regulation 2000* requires modifications of such development consents to be carried out under section 75W of the EP&A Act. Despite the repeal of Part 3A of the EP&A Act, the effect of section 75W is continued for such consents by the operation of clause 12 in Schedule 6A of the Act.

The Department is satisfied that the proposed modification is within the scope allowed under section 75W of the EP&A Act. The Department notes there is no additional coal to be recovered and the new underground layout does not extend the reach of the overall subsidence impacts of the existing underground mine.

3.2 Approval Authority

Under section 75W of the EP&A Act, the Minister for Planning and Infrastructure is the approval authority for this modification application. However, the Director Mining and Industry Assessment may determine the application under the Minister's delegation of 14 September 2011, as:

- less than 25 public submissions have been received that are in the nature of an objection;
- Bulga has not made any reportable political donations; and
- Singleton Council has not objected to the proposal.

3.3 Environmental Planning Instruments

In accordance with section 75I of the EP&A Act, the Department has considered the modification application against the provisions of environmental planning instruments, and considered Bulga's assessment of these issues in the EA, and is satisfied that none of these instruments substantially govern the carrying out of the modification.

3.4 Other Approvals

The modification application relates to a development consent granted under Part 4 of the EP&A Act. Therefore, the integration provisions of sections 75U and 75V do not apply.

4 CONSULTATION

The Department exhibited the modification application in the local press and made the accompanying EA publicly available on its website and at the Department's Bridge Street Information Centre, the Singleton Council Administration Centre and the Nature Conservation Council, between 23 November 2012 and 10 December 2012.

During the assessment process, the Department received submissions from 5 agencies, 1 special interest group and 1 nearby landowner. Copies of these submissions are included at **Appendix C**. A summary of the issues raised in these submissions is provided below. A copy of Bulga's Response to Submissions (RTS) is included at **Appendix D.**

4.1 Agency Submissions

The **NSW Office of Water** (NOW) did not object to the modification application and recommended approval conditions with performance criteria for groundwater impacts based on the assessment in the EA. The Department notes that the existing consent provides for the review of the Water Management Plan following any modification, which provides a sufficient process to accommodate NOW's recommendation.

The **Office of Environment and Heritage** (OEH) did not object to the modification application. It recommended approval conditions for biodiversity offsets for harm to threatened species, and updates to the Aboriginal Cultural Heritage Management Plan to include new OEH protocols. The Department has included appropriate approval conditions in its recommendation.

The **Division of Resources and Energy** (DRE) within the Department of Trade and Investment, Regional Infrastructure and Services did not object to the modification application and recommended an approval condition for the preparation of a mine site Rehabilitation Plan. The Department has included an appropriate approval condition in its recommendation.

Roads and Maritime Services (RMS) noted that general mine traffic is causing morning peak-hour delays at two nearby intersections with the Golden Highway. It recommended an approval condition for a Construction Traffic Management Plan to ensure gas well construction traffic does not further reduce peak hour performance at these intersections. The Department has included an appropriate approval condition in its recommendation.

Singleton Shire Council was given a copy of the EA for the proposed modification and invited to comment, but did not make a written submission.

The **Office of Agricultural Sustainability & Food Security** (OASFS) initially raised several concerns about agricultural land uses and impacts. Subsequent to its review of Bulga's RTS, it raised only the residual concern that subsidence impacts on 25.5 ha of private vineyards in the subsidence affected area should be appropriately assessed and, if necessary, compensated. The Department notes that Private Property Subsidence Management Plans would be prepared in consultation with the landowners under DRE's standard approval conditions for Subsidence Management Plans. These plans would detail likely impacts and Bulga's obligations to make good any damage or compensate any lost productivity.

The **Environment Protection Authority** (EPA) recommended in particular that the Applicant be required to negotiate private agreements under the INP with landowners affected by elevated noise levels during the gas well construction program. As explained in the noise section of this report, there is a lack of certainty in the existing policy arrangements for construction noise on mine sites. The Department has looked to the *Interim Construction Noise Guidelines* to determine the character and severity of noise impacts from the gas well construction program, and finds the noise impacts to be acceptable because they are short term and generally not severe. The Department does not recommend that negotiated agreements be required for these impacts.

4.2 Public Submission

The Department received several objections from one nearby landowner. The objector's property is on Fordwich Road, about 3 km south of the open cut surface disturbance and about 370 m south of the southern-most longwall in the proposed Blakefield North Mine. The property is shown in the EA as receivers 153 and 154. The objector raises issues about worsening noise, vibrations and dust, and asks that Bulga is required by approval condition to purchase the property. All impacts to the objector's property are set out in the EA and supplementary reports. Noise impacts in particular are discussed in the noise section of this report. The Department has concluded that the impacts, and noise impacts in particular, at the objector's property are within acceptable limits and do not warrant an acquisition clause in the consent.

4.3 Special Interest Group Submission

The **Construction Forestry Mining and Energy Union** wrote in support of the proposed modification. It says on the balance of environment and community impacts, the benefits of the proposal outweigh the negative impacts.

5 ASSESSMENT

The key issues arising from the Department's assessment and consultation are:

- noise impacts, particularly during drilling and construction for the gas drainage infrastructure;
- changed subsidence impacts resulting from the modified underground layout; and
- ecological impacts from additional vegetation clearing for gas drainage infrastructure.

5.1 Noise

The noise conditions and operational noise limits in the existing consent were last reviewed in 2010, with the approval of Modification 4. The conditions were based on an assessment of noise impacts under the *Industrial Noise Policy* (INP) for the whole Bulga Mining Complex.

For the proposed modification, Bulga provided a Noise Impact Assessment (NIA) prepared by Global Acoustics. The NIA describes the potential noise impacts from all aspects of the proposed modification, including the continuous operation of goaf gas flares and ventilation fans; coal clearance; and the surface work to install vertical, goaf and surface to in-seam (SIS) gas drainage wells for the mine.

The NIA modelled noise impacts for the first mine access option. This included noise from a pair of upcast and downcast ventilation fans above the access slot and coal clearance by truck and, later, conveyor. The NIA did not model the second option, where coal clearance is by way of the existing conveyor from the Blakefield South Mine and only a single upcast fan is installed above the development headings. However, the Department is of the view that noise impacts from the second option would be less than those predicted for the first option and therefore require no additional analysis.

The surface work to install gas drainage would be undertaken at approximately 102 gas drainage well sites. It involves:

- day-time vegetation clearing (if necessary), earthworks, compaction, and erection of acoustic shields, taking up to 8 days spread over a 2 to 4 week period for each well pad;
- 1 to 2 weeks of day-time drilling using a diesel rig for each of 85 vertical/goaf wells;
- 4 to 12 weeks of 24-hour drilling using an electric SIS rig for each of 17 SIS wells, and
- installation of well heads, although this is not a noisy activity.

The NIA states that noise levels from all aspects of the modification would comply with the Complex's operational noise limits, except for potential impacts on up to 28 receivers from the installation of 19 wells, including 1 SIS well (see **Figure 5**). The Department asked Global Acoustics to provide more precise detail regarding predicted noise impacts from these well sites (**Appendix E**). Day limit exceedances are predicted at 20 receivers ("day affected receivers") and, owing to 24-hour drilling for SIS wells, evening/night limit exceedances are predicted at 9 receivers ("night affected receivers"), each affected by 1 of these wells. Day and evening/night limit exceedances occur together at only 1 receiver (receiver 217).

The Department first notes that there is a gap in coverage between the INP and the *Interim Construction Noise Guidelines* (ICNG), which means that neither policy explicitly deals with construction noise for mining or quarry proposals. In the absence of clear guidance within the INP and ICNG (which the EPA has committed to clarify via a review of both documents), the Department must consider the most appropriate assessment guideline to be used in the individual circumstances. The Department's usual practice is to assess noise from construction work at a mine under the INP as operational noise. This is because key elements of mine construction, such as the removal of overburden, are basically mining itself. However, when work is short-term and in the character of civil construction, it is the Department's long-standing practice to assess related noise as construction noise. In these circumstances, the ICNG is the most relevant and appropriate tool to assess, manage and mitigate noise related to mining and quarrying construction.

5.1.1 Day affected receivers

The Department has therefore assessed predicted day time noise levels at the day affected receivers under the ICNG. In doing so, the Department considered whether:

- work for the installation of gas wells is short term and in the character of civil construction;
- predicted noise levels and any proposed mitigation comply with the thresholds in the ICNG; and
- any additional noise related approval conditions are necessary.

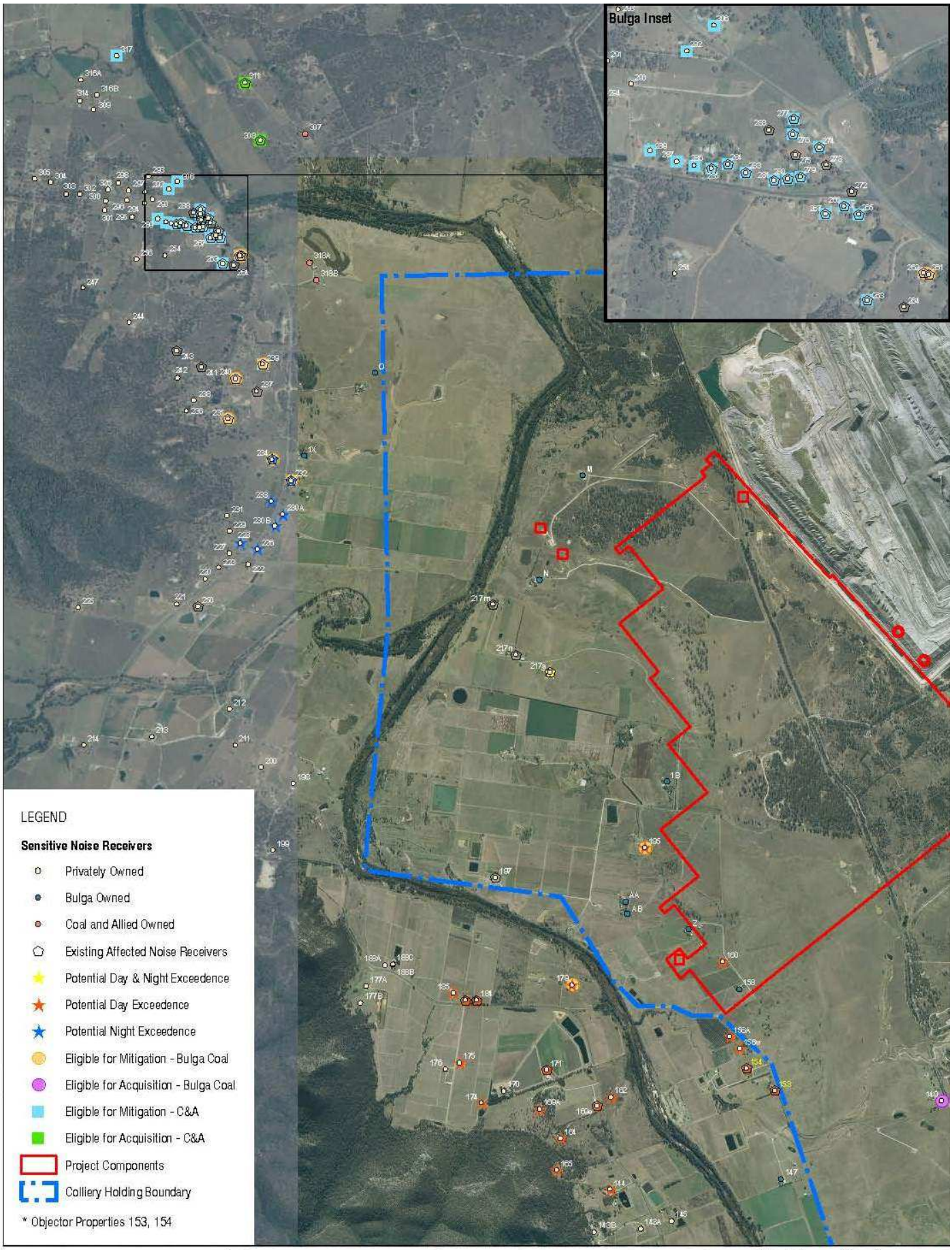


Figure 5 *– Noise-affected receivers*

The pre-mining and goaf gas drainage wells would be installed in individual campaigns for each longwall. In each campaign, there would be about 18 months to 2 years respite between the work at vertical well sites and goaf well sites. Bulga has also committed to at least 6 months respite from work on exposed sites between campaigns. The Department is of the view that a day time work schedule of this episodic and essentially short term nature is in the character of civil construction activity.

For receiver 160, which is the worst-affected of the day affected receivers owing to its location above the southwestern end of Longwall 1 and its consequent close proximity to a number of wells, predicted noise levels are above the operational noise limits on intermittent days in 5 distinct periods of approximately:

- 72 days for 4 vertical wells over Longwall 1, followed by 1.5 to 2 years respite;
- 90 days for 5 goaf wells over Longwall 1, followed by at least 6 months respite;
- 36 days for 2 vertical wells over Longwall 2, followed by 1.5 to 2 years respite;
- 44 days for 3 goaf wells over Longwall 2, followed by at least 6 months respite;
- 18 days for 1 vertical well over Longwall 3.

All 19 other day affected receivers are exposed to fewer gas well locations, including the objector's property (receivers 153 and 154), which is located well south of the southwestern end of Longwall 1. Receiver 154 (the nearer of the two) is some 850 m south of receiver 160.

There are no day time noise predictions that exceed the 'highly noise affected' threshold in the ICNG, which is 75 dB $L_{Aeq\ 15\ min}$. The predicted noise level at the worst affected receiver (number 160) is up to a maximum of 67 dB $L_{Aeq\ 15\ min}$ for a short period during the installation of goaf well number P1_16, which is less than 150 m away. The predicted noise levels at all other receivers, including the requisite 5 dB(A) modifying factor adjustment for low frequency noise where necessary, are 50 dB $L_{Aeq\ 15\ min}$ or less (usually much less). At this level, the noise predictions are comparable to the existing experience of day time noise in the locality. Day time median readings at nearby noise monitors are 45 dB to 51 dB $L_{Aeq\ 11\ hour}$, while the INP specifies an acceptable amenity criterion for rural residences of 50 dB $L_{Aeq\ period}$.

Consequently, gas well installation at these sites, occurring during standard day time construction hours, would be deemed acceptable under the ICNG, subject to application of all reasonable and feasible noise controls and the notification of affected residents in advance. The Department also notes that, of the proposed 102 wells, only 18 vertical and goaf wells for Longwalls 1, 2, 3, 6 and 7, and one SIS well are close enough to any receiver to cause construction noise impacts which are above the Complex's *operational* noise limits.

Bulga has committed to a range of reasonable and feasible noise controls including proper equipment maintenance, installing a 4.2 m high acoustic barrier for the drill rig, continuous noise monitoring, and modifying activities during noise-enhancing meteorology. The Department believes that any further noise controls would be costly (such as acquisition of an electrically-powered vertical drill) and would only marginally reduce the severity or duration of noise impacts. At many affected receivers, additional mitigation measures may actually extend or make worse the potential interruption to amenity because of the work required for installation.

5.1.2 Evening and night affected receivers

The Department understands that 24-hour SIS drilling is necessary because it is not practical to stop an SIS drill overnight. Stopping overnight would increase the risk of equipment damage, as the horizontal or angled drill shaft cannot be left in-situ and the drill head is vulnerable to damage or loss during retraction. It would also extend the duration, cost and impact of an already long drilling program. This means that the proposed SIS drilling would occur outside the ICNG's standard day time construction hours, which are 7 am to 6 pm. Bulga has acquired an electrically powered SIS drill, which is much less noisy than the diesel rig it replaces, in order to minimise night time noise emissions. Consequently, predicted noise levels for 16 SIS wells are within the operational noise limits and they may be installed without additional noise impacts to any receiver.

However, one SIS well (SIS 40), located to the northwest of Longwall 7, is close enough to nearby receivers that noise levels are predicted to exceed the evening/night *operational* noise limits at 9 "night affected receivers". The predicted exceedances:

- are not more than 1 dB $L_{Aeq\ 15\ min}$ for 8 receivers, and 2 dB $L_{Aeq\ 15\ min}$ for receiver 217;
- are dominated by emissions from the open cut mine, which means the drilling noise would be difficult to discern;
- are up to 6 dB $L_{Aeq\ 1\ min}$ above the sleep disturbance limit at receiver 217 only;
- would occur only during southeast or east-south-east winds of up to 11 km/h for 8 receivers, and only during strong inversions for receiver 217; and
- would take place over a maximum period of 4 to 6 weeks.

The Department notes that these predicted exceedances are generally marginal and of short duration. Cumulative noise predictions during this drilling (ie including the Complex) generally range between 34 – 37 dB $L_{Aeq\ 15\ min}$ at night and from 36 – 38 dB $L_{Aeq\ 15\ min}$ during the evening. Only 2 properties exceed these levels, and that only by 1dB, during one or the other of the two periods. These levels are substantially less than the INP's recommended and maximum amenity criteria for rural residences of 40 dB $L_{Aeq\ period}$ and 45 dB $L_{Aeq\ period}$, respectively.

Bulga has also committed to best efforts to drill SIS 40 during favourable meteorological conditions. The Department notes that SIS 40 would be unlikely to create impacts at all if drilling takes place during winter, because:

- source to receiver winds occur on only 25% of evenings and 6% of nights;
- strong inversions occur on only 33% of nights; and
- receivers are highly likely to close windows at night, providing significant sound attenuation.

5.1.3 Recommended Conditions

The approved underground mine could not proceed without gas drainage. Reducing methane concentration in the underground mine is critical to worker safety as it prevents methane asphyxiation and reduces the risk of explosion and fire. On the balance of benefits to the safety of hundreds of workers in the mine, versus strictly managed and short term construction noise impacts, the Department considers the public interest is best served by the installation of the gas drainage infrastructure. While the EPA has taken a view that noise impacts from gas well installation should be assessed under the INP, the Department believes the INCG is the more relevant guideline for these short-term construction impacts, as discussed above.

Even so, the exceedances of the Complex's *operational* noise limits are very limited. Drilling of 19 of 102 wells would cause limited day time exceedances, and the required 24-hour drilling of a single SIS well would also cause evening and night time exceedances of 1 - 2 dB $L_{Aeq\ 15\ min}$ for a total of 9 receivers, for a period between 4 and 6 weeks. The Department considers that these exceedances are generally minor, generally episodic with substantial periods of relief, and have a limited duration. It does not consider that negotiated agreements are required in the circumstances. It is also not appropriate to vary the Complex's operational noise limits, either temporarily or permanently.

Nonetheless, the Department considers there is a need for additional noise related conditions for the modification approval. Following assessment of the noise impacts, the Department recommends approval conditions that:

- specify standard ICNG construction hours at those well sites where noise levels are predicted to exceed operational noise limits, except for drilling at SIS well 40;
- require notification to affected residents well in advance of any noise levels that are expected above operational noise limits; and
- require preparation of a Construction Noise Management Plan setting out a schedule for the construction work, reasonable and feasible noise mitigation, monitoring and a response protocol should there be isolated occasions where noise impacts are higher than predicted.

The Department also proposes to use this opportunity to update the noise impact assessment criteria in the consent to match the criteria in the open cut consent, so as to ensure consistency between the consents.

5.2 Subsidence

Approval for multi-seam mining at the Complex has been in place since DA 376-8-2003 was first granted in February 2004. The approved layout for the Blakefield North Mine was included in the original EIS for DA 376-8-2003. Mining was approved on the basis of longwalls with a face width of between 150 m and 400 m. At that time, Bulga's longwall technology allowed for a maximum face width of 265 m, but consent was sought for a range of widths in anticipation of newer, wider technology by the time Blakefield North Mine was due to commence. Bulga now seeks approval for an underground longwall layout that:

- is based on the previously-approved 400 m face width instead of the nominal 265 m face width in use at the time of the original consent; and
- accommodates the potential changes to the open cut operation that are proposed in the Bulga Optimisation Project, which require omission of parts of the approved underground layout in the Blakefield North Mine (because those parts would become part of the open cut), and development of main headings instead of access adits off the Whybrow Pit highwall.

5.2.1 Revised Subsidence Predictions

The modified layout has a different shape to the approved layout, and therefore affects different areas on the surface. It also now involves stacked geometry (in some cases) instead of offset geometry, resulting in more severe subsidence than was originally predicted. The EA included a Subsidence Impact Assessment (SIA) prepared by MSEC. The SIA notes the following changes in subsidence resulting from the modified layout:

- maximum vertical subsidence would decrease from 3.265 m to 3.1 m (total multi-seam 5.1 m), owing to more accurate information about the thickness of the Blakefield Seam.
- the majority of tilt and strain predictions, where they occur over offset geometry, are similar to the approved mine layout. However, where occurring over stacked geometry that did not occur in the existing approved layout:
    - maximum tilt would increase from 24 millimetres per metre (mm/m) to 100 mm/m; and
    - maximum strains would increase in-line with those observed at the multi-seam Blakefield South Mine, where the maximum tensile strain was 23 mm/m, and the maximum compressive strain was 19 mm/m.

5.2.2 Built features

The most significant overlying built features include Charlton, Cobcroft and Fordwich Roads; Telstra's copper and fibre optic cables; a private irrigation district (PID) pipeline; and a dwelling house (see **Figures 6 and 7**). None of these features are critical public infrastructure. There is no overlying surface mining, although Bulga would carry out a geotechnical assessment of the Whybrow Pit highwall located approximately 300 m northeast of the mine footprint, and implement any measures to ensure that the highwall remains stable both during and after mining.

Charlton Road is a sealed Council road which follows the alignment of the Great North Road, which was a convict-era road connecting Sydney to the Hunter Valley. The alignment is historically significant in parts, although there is no NSW heritage listing for the section overlying the Blakefield North Mine. Cobcroft Road is also a sealed Council road, while Fordwich Road is an unsealed Council road. These roads and the associated road drains would undergo the full range of predicted subsidence; resulting in troughs, ponding, compression heaving and cracking, which could affect public safety and serviceability.

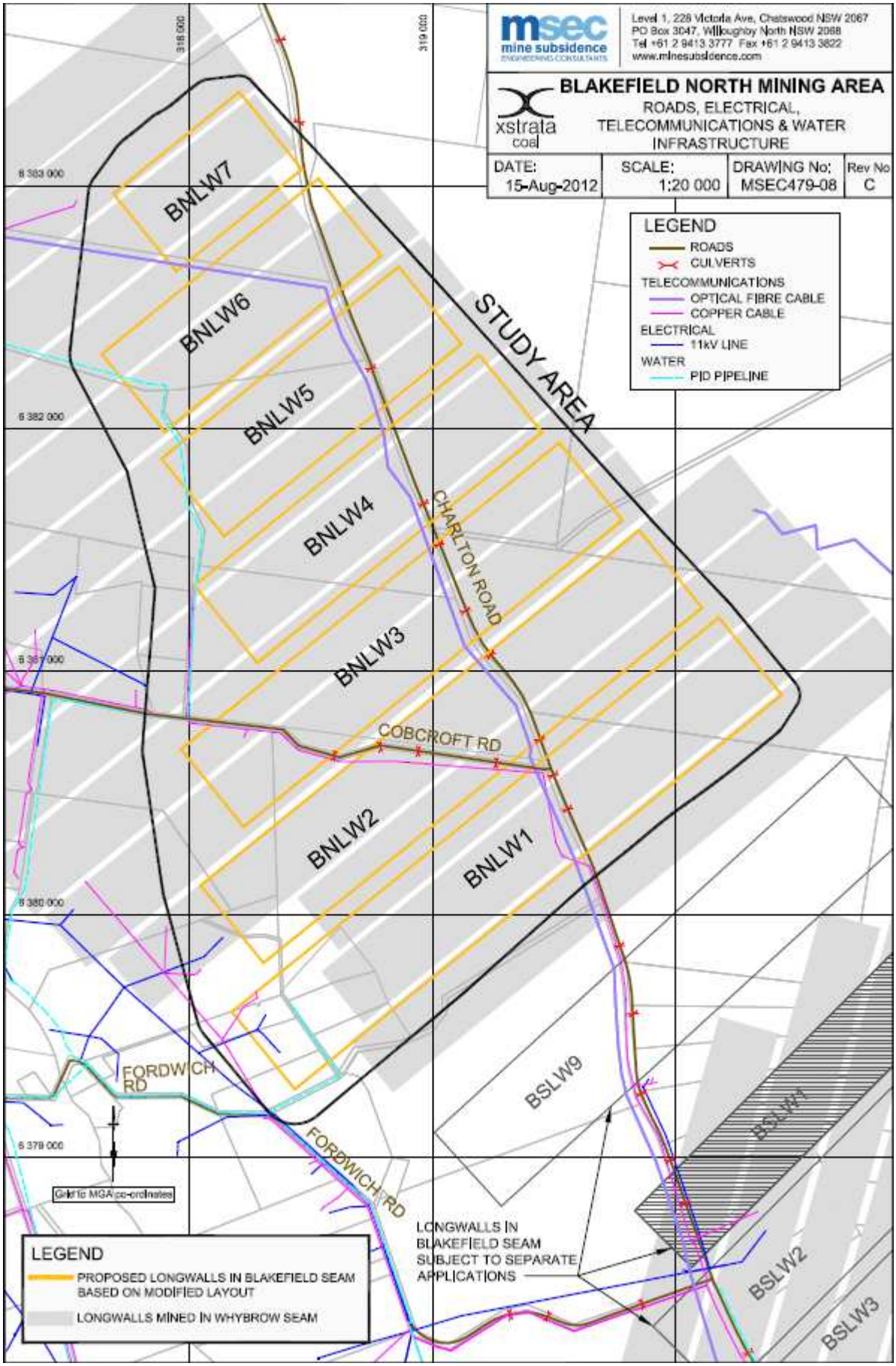


Figure 6 *– Overlying Linear Surface Features*

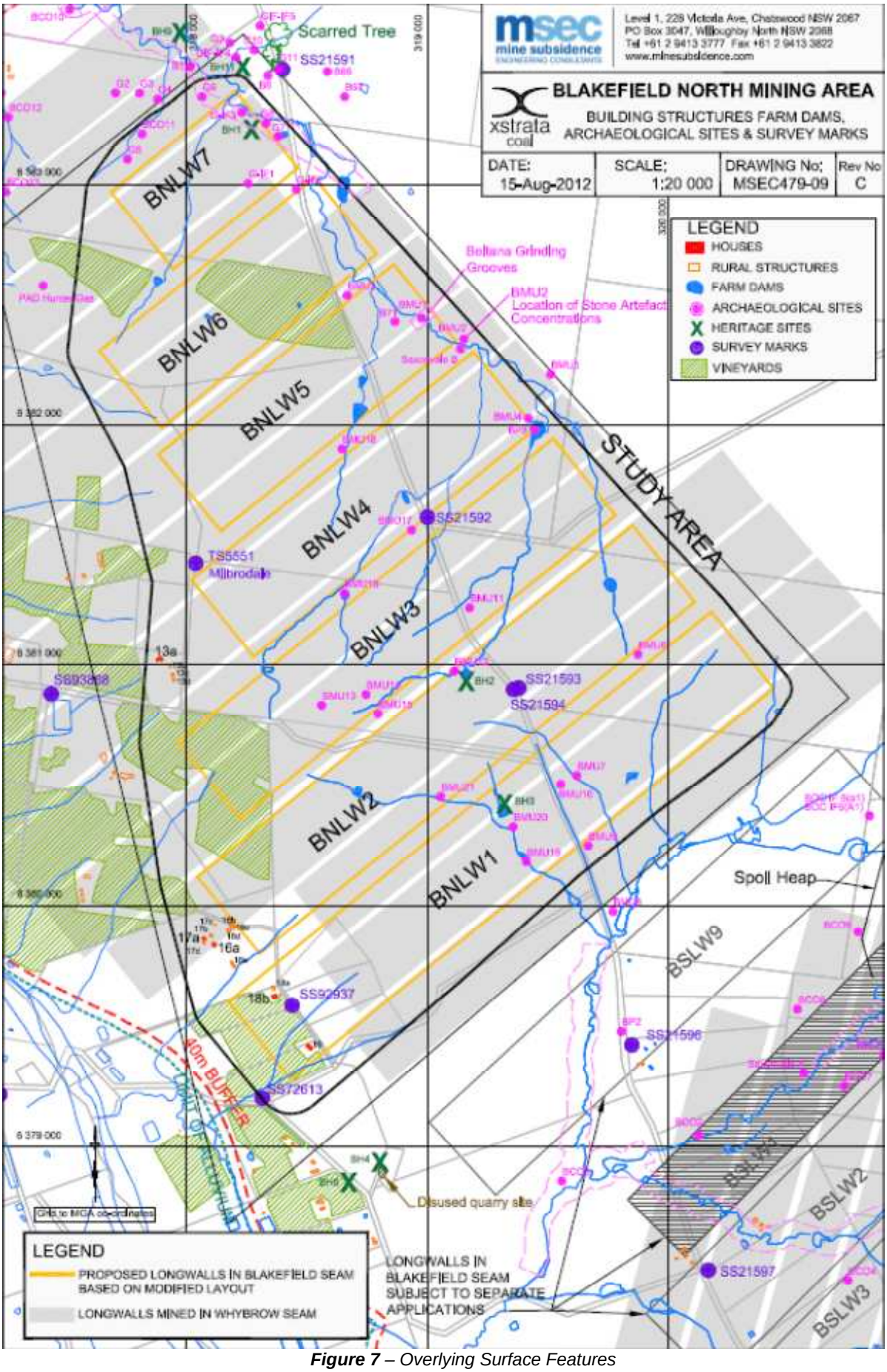


Figure 7 *– Overlying Surface Features*

However, the road formations are of flexible construction and these impacts would develop gradually, in time to be observed and repaired using normal road repair methods. Charlton Road, in particular, has been previously subsided without mishap both during the single seam Beltana No 1 operation and the multi-seam Blakefield South operation. Bulga would visually monitor and inspect impacts as they occur and manage safety, serviceability and repairs in consultation with Council, according to its existing management strategy.

Telstra's fibre optic cable runs adjacent to Charlton Road and there are copper cables adjacent to both Charlton and Cobcroft Roads. These cables would experience the same range of subsidence effects as the roads and have also been previously subsided without incident under single and multi-seam mining at Beltana No 1 and Blakefield South. A duplicate of the fibre optic cable has already been installed inside a flexible duct adjacent to Charlton Road. This was a subsidence impact preventative measure before Beltana No 1 was extracted. It should withstand the additional subsidence if there is enough cable to draw at either end of the duct. Bulga would continue to manage subsidence impacts in consultation with Telstra and according to its existing management strategies.

A PID pipeline made of butt-welded polyethylene crosses the south-western end of proposed Longwalls 4, 5 and 6, and a smaller distribution line crosses proposed Longwall 3. The pipeline design was approved by the Mine Subsidence Board to withstand strains of at least 70 mm/m. This is more than the strains expected under the proposed modification. However, the MSEC report recommends the pipe should be uncovered and provided with a sand base directly above the ends of Longwalls 5 and 6 so that it is isolated from localised unconventional subsidence. Bulga has committed to do this. The pipeline has previously been subsided over the Beltana No 1 Mine and Bulga would continue to manage subsidence impacts according to is existing management strategies.

There is a private dwelling and associated Colorbond shed above the south-western part of proposed Longwall 1. The buildings are located outside the multi-seam profile and, consequently, subsidence is predicted to be slightly less under the modified mine plan because the Blakefield Seam is thinner than previously thought. Nonetheless, predicted tilt for the house is up to 13 mm/m, which may cause serviceability problems (e.g. door frame sticking, wet area drainage, etc). The house may ultimately need to be re-levelled. Notwithstanding, the house is timber-framed and elevated on brick piers so it is expected to tolerate the predicted subsidence without becoming unstable. Bulga would manage subsidence impacts and any necessary repairs to both the dwelling and shed under a Private Subsidence Management Plan approved by DRE.

The OASFS noted that there are 3 privately-owned vineyards totalling 25.5 ha over proposed Longwalls 1, 2 and 3, which should be compensated for any subsidence impacts. Private Property Subsidence Management Plans would be developed in consultation with the affected landowners as part of the DRE Subsidence Management Plan approval process. Such plans would detail Bulga's obligations to remediate, repair or compensate subsidence impacts on agricultural infrastructure and productivity. The *Mining Act 1992* also contains comprehensive provisions relating to compensation to private landowners for damage to the land and/or agricultural productivity caused by mining.

There is also an assortment of minor built features such as survey marks, farm dams, fences and an 11 kV electricity line that are expected to tolerate the predicted subsidence without major impacts on safety or serviceability. Bulga would need to update its existing subsidence management strategy to account both for the additional subsidence, and any additional built features that are likely to be impacted under the new mine plan.

5.2.3 Heritage and natural features

A set of Aboriginal grinding grooves, known by their reference number "BMU1", and a range of other Aboriginal objects have been previously disturbed by the Beltana No 1 mine under an Aboriginal Heritage Impact Permit (AHIP) issued by OEH. The bedrock around the grooves was slotted in a successful attempt to isolate it from subsidence impacts (ie cracking). The grinding grooves are located directly above the eastern end of proposed Longwall 5 and would no longer

overlay stacked pillars as they had under the approved mine plan. This means they are likely to experience additional compressive and tensile strains. However, the existing AHIP permits full destruction of this site, and so its further disturbance under the revised mine plan is not considered to be significant. Further, the site would be impacted by open cut mining if the Bulga Optimisation Project is approved, prior to the anticipated subsidence impacts.

There are a small number of European heritage items (2 fence posts and a site with assorted historic building rubble) in the subsidence area, which may be affected by cracking. Bulga proposes to manage such impacts, and any necessary remediation, in consultation with the appropriate authority.

The Wollombi Brook alluvial buffer zone is at least 145 m southwest of the predicted 20 mm subsidence isopleth and is not expected to experience any direct subsidence impacts (potential groundwater drawdown is discussed in **Table 1**). Ephemeral surface drainage over the subsidence area would experience the full range of subsidence effects; resulting in localised inundation, ponding and temporarily-altered surface flows. Some surface cracking is likely, although it would probably quickly close over with sediment during rainfall, thereby preventing major inflows into cracked or dilated strata. Bulga would carry out detailed hydrological studies of the subsidence area before mining to identify particular impacts and any necessary preventative or remedial work to ensure there are no significant long-term diversions of surface water to the sub-surface.

5.2.4 Recommended Conditions

The Department is satisfied that:

- Bulga already has development consent to conduct multi-seam mining in the Blakefield North Mine using longwalls with width of up to 400 m;
- predicted subsidence from the modified longwall layout would increase where occurring above stacked chain pillars, but does not lead to impacts that are unacceptable;
- SMP approvals are currently required from DRE for all longwalls in the Blakefield Seam; and
- DRE gives particular attention to the subsidence impacts of multi-seam mining.

However, the Department is concerned at the absence of a strong, contemporary subsidence impact management regime under DA 376-8-2003. The Department therefore proposes to include conditions requiring preparation of an Extraction Plan for all longwalls not covered by an SMP approval by 1 January 2014.

5.3 Ecology

The EA was accompanied by a flora and fauna assessment prepared by Umwelt. Approximately 709.25 ha of land is predicted to experience 20 mm or more of vertical subsidence and/or is located within a 26.5 degree angle of draw from the proposed longwalls. Some of the land within this subsidence area would be subject to subsidence impacts, which could lead to surface cracking and altered geomorphology, with potential consequences for the structure and composition of vegetation communities on the surface. This 709.25 ha area comprises approximately:

- 118.25 ha of native or regenerating woodland;
- 468.5 ha of native grasslands; and
- 122.5 ha of land already disturbed by mining or agriculture.

The proposal also requires 35 ha of surface disturbance (including 5.34 ha of clearing) within this larger area for gas drainage and surface facilities. Bulga has committed to avoid the clearing of trees wherever possible. For example, surface facilities such as the goaf gas plant would be located on already disturbed land and existing tracks would be used, wherever possible, for construction vehicle access to the proposed gas drainage well pads. Notwithstanding, the gas drainage boreholes and other surface facilities would result in the direct disturbance of up to:

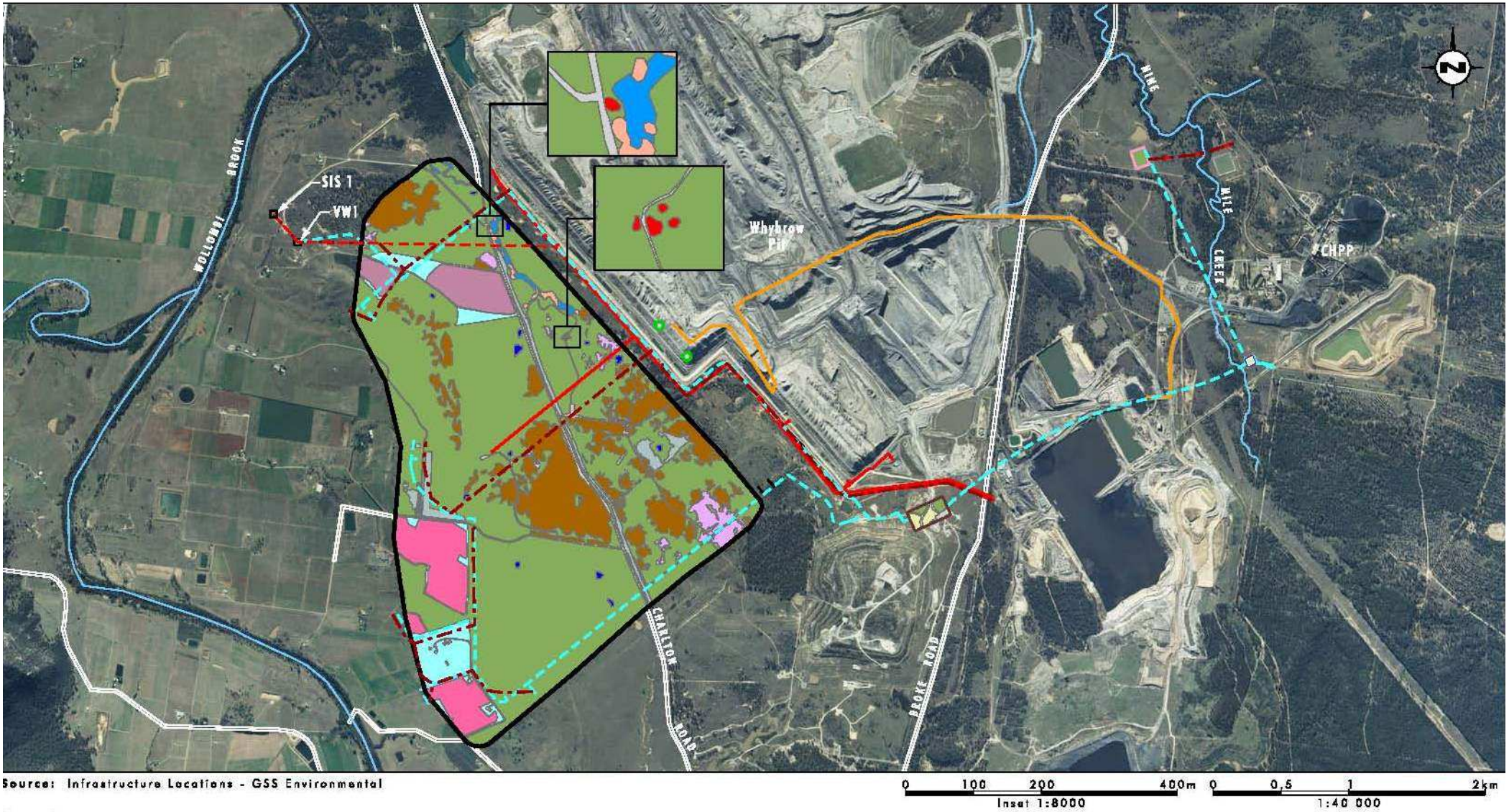


Figure 8 *– Endangered Ecological Communities and Endangered Population habitat*

- 5.34 ha of woodland;
- 23.71 ha of derived native grassland;
- 2.94 ha of regenerating woodland, or rehabilitated land; and
- 3.06 ha of farm or mine disturbed land.

There are 2 Endangered Ecological Communities (EECs) and 1 Endangered Population within the subsidence area or the surface facilities areas, as follows (see **Figure 8**):

- 103 ha of *Central Hunter Grey Box – Iron Bark Woodland* EEC, of which approximately 5 ha would need to be cleared for the surface facilities;
- 0.15 ha of *Hunter Valley Weeping Myall Woodland* EEC; and
- 760 mature and 2050 juvenile individuals of Weeping Myall (*Acacia pendula*) which constitute an Endangered Population.

The proposal requires 5.34 ha of *Central Hunter Grey Box – Ironbark Woodland* EEC to be cleared and 23.71 ha of the associated derived native grassland. The proposal does not require any individual *Acacia pendula* to be cleared, either within the EEC or the broader Endangered Population.

The subsidence area contains suitable habitat for a range of fauna species known to occur within 10 km of the site. In particular, 13 species of threatened avifauna were observed (or their sounds recorded) in targeted surveys of the site. Woodland habitat occurs on the site as isolated 15 to 30 ha patches dominated by an open canopy of regenerating or middle-aged trees with a scattered to moderate understory. However, while useful for foraging, breeding and/or shelter, there are no areas of significant habitat for any threatened fauna and no areas that are contiguous with larger areas of better quality habitat in the nearby national parks.

Changes to geomorphology resulting from surface subsidence would be closely monitored by Bulga as part of its existing subsidence management regimen. Minor surface cracking would naturally fill with sediment, while any more severe cracking would be repaired to prevent excessive loss of surface water to the sub-surface. Localised erosion, ponding and surface-flow diversions would be physically repaired so that there would be no significant long term changes to local surface hydrology. Vegetation communities are seldom significantly impacted by subsidence, with the notable exception of groundwater dependent ecosystems such as upland swamps. Bulga's continued management of changes to local geomorphology would further limit potential impacts to the structure and composition of vegetation communities. The Department is therefore satisfied that habitat resources for all flora and fauna would remain essentially intact post-subsidence.

The key issue regarding flora and fauna impacts is therefore the proposed clearing of 5.34 ha of *Central Hunter Grey Box – Ironbark Woodland* EEC and 23.71 ha disturbance of associated derived native grassland. The Department considers that these areas are large enough to warrant a biodiversity offset, notwithstanding that it is less than 0.05% of the distribution of this EEC. Nonetheless, individual small offsets for clearing of this scale can be inconvenient and inefficient to establish and manage. Consequently, Bulga is proposing an offset as part of a larger biodiversity offset at Reedy Valley, a large property 70 km northwest of the Complex, where it is proposing to offset the much more significant biodiversity impacts of the Bulga Optimisation Project. This would allow Bulga to consolidate (but separately count) an offset for the Bulga Optimisation Project with a number of other smaller biodiversity offset obligations, including both an existing requirement and the impacts of this current modification, on a contiguous tract of land.

The Department and the OEH both consider that Bulga's provision of an offset as part of the larger Reedy Valley offset is an acceptable and appropriate approach, given the small additional area of offset land involved in respect of this current modification. The Department has therefore included a condition in its recommended approval which requires Bulga to provide an offset for the 5.34 ha of EEC clearing and 23.71 ha of disturbance, to the satisfaction of the Director-General, by the end of December 2014.

5.4 Other issues

The Department's consideration of other issues is in Table 1.

Table 1 *– Assessment of other issues*

Issue	***Impact and Consideration***	***Recommendation***
Air quality	• The EA included an Air Quality Impact Assessment prepared by PAE Holmes. • Cumulative nitrogen dioxide emissions were assessed for all emissions including the additional gas-fired electricity generators, gas flares, and VAM abatement system. The maximum cumulative 1-hour concentration is below the relevant assessment criterion. • Monitoring of discharges from flares and the existing and proposed electricity generating plant would be carried out under the EPL; • Standard dust control measures (ie watering) would minimise dust emissions from gas well pad construction sites.	While predicted impacts are low, it is appropriate to update the existing conditions of consent to more contemporary standards.
Groundwater	• Predicted groundwater drawdown impacts are not significantly different to the approved mine plan. The modification is unlikely to lead to groundwater impacts that are materially different to those predicted in the original 2003 EIS. • The Wollombi Brook alluvium is 145 m beyond the 20 mm subsidence isopleth and is unlikely to be directly impacted. Drawdown in the Wollombi Brook alluvium would remain less than 10%, as was previously predicted and approved, and may be accompanied by a slight reduction in salinity as saline water is gradually drawn from the fringe of the alluvium. • The cumulative impacts of both underground and open cut operations were remodelled in 2009 and 2012 by Mackie Environmental Research. On both occasions groundwater impacts were found to be consistent with the 2003 EIS modelling. No change in salinity has so far been observed in the alluvium and observed groundwater impacts have not required an alternate water supply to be provided to private bore licensees. Drawdown would be required to be subject to a water access licence granted by NOW. • NOW recommends continuation of groundwater monitoring to verify that impacts remain at or below the levels predicted in the 2003 EIS, especially following the completion of the 3 longwalls closest to the Wollombi Brook alluvium. NOW also recommend that a contingency plan is developed to be implemented if impacts exceed predictions. • The existing consent has a comprehensive suite of water-related conditions, including a requirement for a management plan with monitoring and contingency planning. This plan would be updated and submitted to the Department in advance of extraction in the Blakefield North Mine.	No additional conditions are necessary.
Workforce	• The Department notes that the modification includes regularisation of the proposed workforce at 530 (up from 300). The existing consent does not make provision for developer contributions and consequently	No additional conditions necessary

Issue	Impact and Consideration	Recommendation
	it is not proposed to update it to require a contribution to Council in respect of the additional workers.	
Mine layout	• The Department notes that the proposed deletion of access adits from the mine plan, in favour of development headings, would result in no material change to the impacts associated with accessing the underground mine. The development headings would be designed to prevent subsidence of the land above.	No additional conditions necessary.
Landscape and visual impacts	• The additional gas drainage infrastructure would be quite visible against a background of farm land and, in some cases bushland. • The existing consent has a condition that requires the visual impacts of gas drainage to be minimised to the satisfaction of the Director-General. This condition would apply to the proposed gas drainage infrastructure.	No additional conditions are necessary.

6 RECOMMENDED CONDITIONS

The Department has drafted recommended conditions for the modification to address the recommendations made in Section 5 above (see **Appendix A**). While the existing consent has been modified on 4 previous occasions, it is somewhat out-of-date when compared with contemporary underground coal mining consents. Consequently, the recommended conditions are quite extensive with the aim of modernising most aspects of the existing consent. Bulga has reviewed and accepted these conditions.

7 CONCLUSION

The Department has assessed the modification application in accordance with the relevant requirements of the EP&A Act, including the objectives of the Act and the principles of ecologically sustainable development.

The recommended consent conditions are quite extensive and aim to modernise the provisions and administration of the consent for the underground operation. In particular, the Department has recommended changes to the conditions for subsidence, surface infrastructure, air quality, rehabilitation and reporting, and added a condition that requires land clearing to be offset with a suitable biodiversity offset.

On balance, the Department considers that proposed modification is in the public interest and should be approved, subject to conditions.

8 RECOMMENDATION

It is RECOMMENDED that the Director Mining and Industry Projects, as delegate of the Minister:

- **consider** the findings and recommendations of this report;
- **determine** that the proposed modification falls within the scope of section 75W of the EP&A Act;
- **approve** the application under section 75W, subject to conditions; and
- **sign** the notice of modification in **Appendix A**.

Howard Reed 10.10.13

Howard Reed
Manager, Mining Projects

David Kitto
Director, Mining and Industry Projects

APPENDIX A – NOTICE OF MODIFICATION

APPENDIX B – ENVIRONMENTAL ASSESSMENT

APPENDIX C – SUBMISSIONS

APPENDIX D – BULGA'S RESPONSE TO SUBMISSIONS

APPENDIX E – ADDITIONAL NOISE IMPACT ASSESSMENT