ASSESSMENT REPORT

WAMBO COAL MINE
Additional Longwalls Modification (DA 305-7-2003 MOD 13)

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1. BACKGROUND

The Wambo Coal Mine is located in the Hunter Valley about 15 kilometres (km) west of Singleton, near the village of Warkworth (see **Figure 1**). The mine is bounded by several coal mining operations to the north and east, agricultural activities associated with Wambo Creek and Wollombi Brook to the south and Wollemi National Park to the southwest (see **Figure 2**).

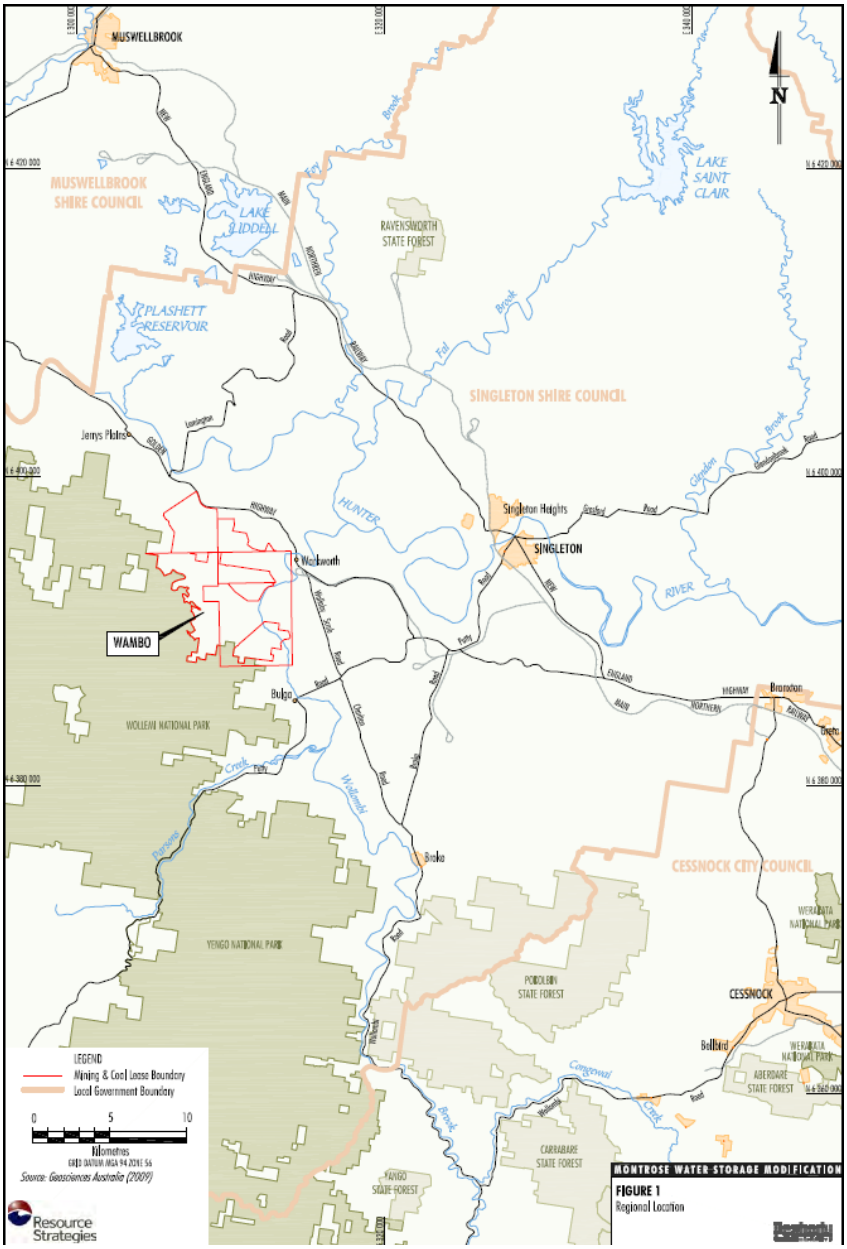

Figure 1 *- Locality map*

The mine originally commenced operations in 1969 and is currently operated by Wambo Coal Pty Limited (Wambo), a subsidiary of Peabody Energy. The existing mine comprises three operations: the North Wambo Underground Mine (the subject of the current modification application), the South Wambo Underground Mine and the Wambo Open Cut Mine.

Current operations at the mine are controlled by two Ministerial development consents: one for the open cut and underground mining operations (DA 305-7-2003 granted on 4 February 2004), and the other for the associated rail operations (DA 177-8-2004 granted on 16 December 2004). Under these consents, Wambo is allowed to:

- extract up to 14.7 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal, comprising
  - up to 8 Mtpa ROM coal from its open cut mining operations; and
  - up to 7.5 Mtpa of ROM coal from its underground mining operations;
- process this ROM coal at its onsite coal handling and processing plant (CHPP); and
- transport up to 15 Mtpa of product coal from the mine via rail.

With mining of approved Wambo Seam Longwalls 1-8 in the North Wambo Underground Mine scheduled for completion by the end of 2014, Wambo has identified an opportunity to optimise coal recovery from this seam through the development of two additional longwall panels to the southeast of the existing longwalls.

2. PROPOSED MODIFICATION

The proposed modification, described in detail in the Environmental Assessment (EA, see **Appendix C**), comprises the development of two additional longwall panels (Longwalls 9 and 10) in the Wambo Seam, to recover an additional 3.7 million tonnes of ROM coal from the North Wambo Underground Mine.

The modification would continue the existing mining operations in this seam and utilise the existing North Wambo Underground workforce and equipment fleet. No changes are proposed to the currently approved extraction rate, coal processing and transport arrangements, operating hours or surface gas drainage. Some ancillary surface disturbance would be required to develop dewatering bores. All other aspects of the approved mining operations would remain the same.

Wambo has also proposed an administrative amendment to its consent conditions which would see the existing subsidence impact performance measure for Wollemi National Park modified from "nil impact" to "negligible impact", which would be consistent with other recent approvals.

The proposed modification is shown in **Figure 2** and **Figure 3**.

3. STATUTORY CONTEXT

3.1 Modification

DA 305-7-2003 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 additional coal to be recovered is a small fraction of the mine's annual and overall coal production, and is almost entirely within the existing approved underground mine disturbance footprint.

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, under the Minister's delegation of 14 September 2011, the Planning Assessment Commission (PAC) must determine the application as Wambo's parent company, Peabody Energy, has made reportable political donations.

3.3 Environmental Planning Instruments

In accordance with section 75I of the EP&A Act, the Department has considered the modification against the relevant provisions of relevant environmental planning instruments, and considered Wambo'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

Because the approval being modified is a development consent under Part 4 of the EP&A Act, the integration provisions of sections 75U and 75V do not apply to the modification.

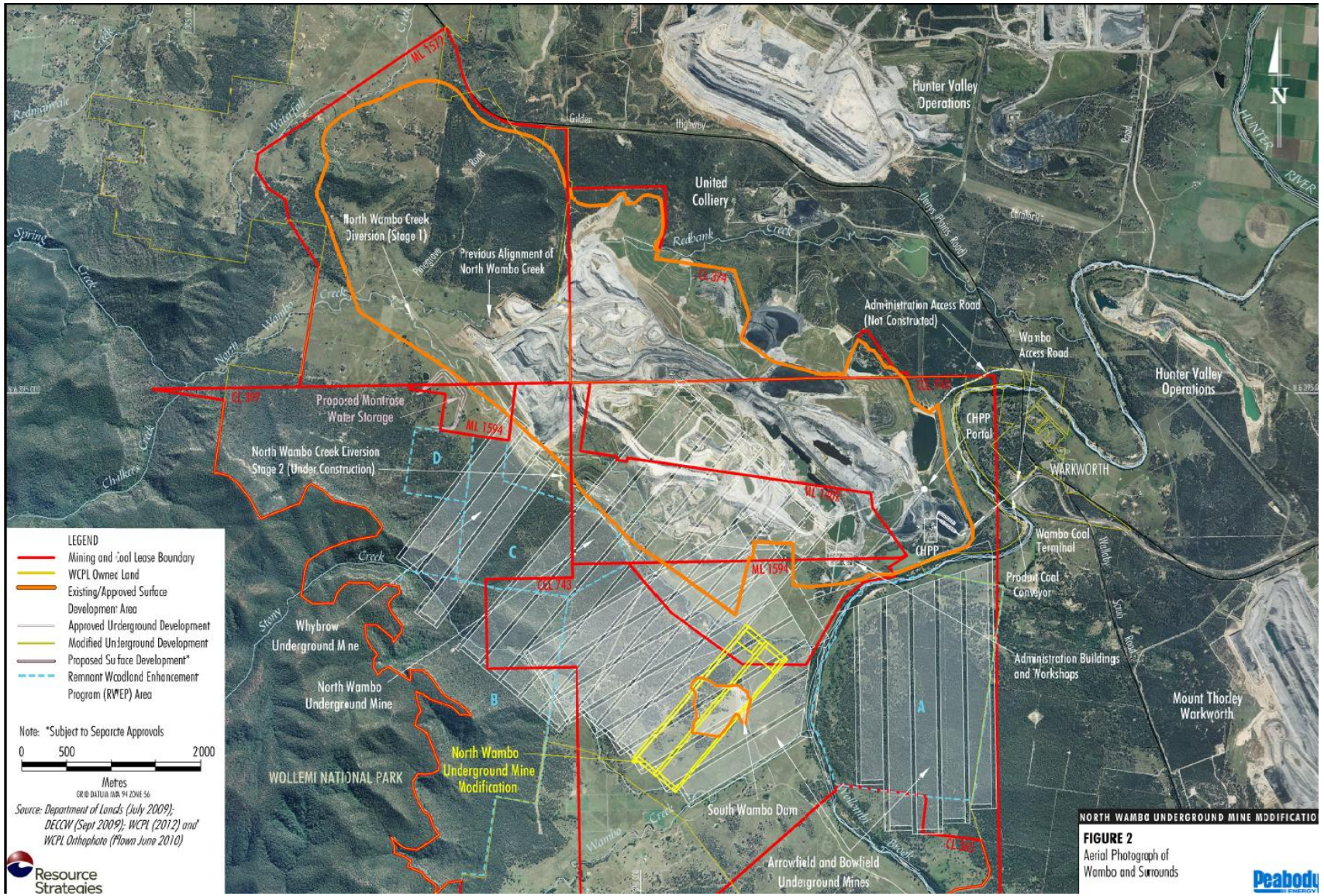

Figure 2 *– Proposed modification to the North Wambo Underground Mine showing Longwalls 9 and 10*

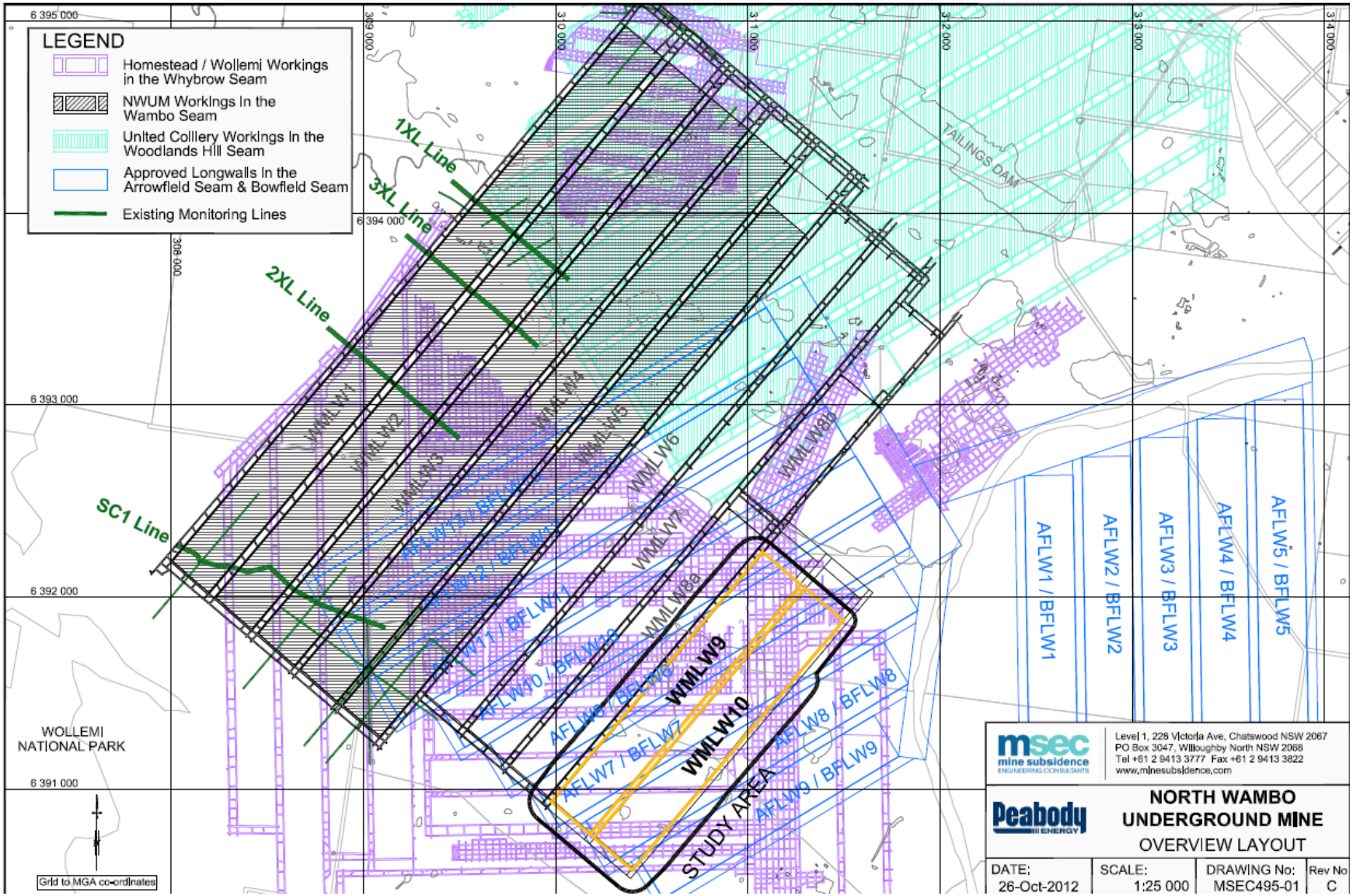

Figure 3 *– Layout of proposed Longwalls 9 and 10 and approved North Wambo Underground Mine workings*

Consequently, a number of separate approvals are still required. The Heritage Council has recently granted approval for the extension of Longwalls 9 and 10 into the Wambo Homestead Curtilage under section 60 of the *Heritage Act 1977*.

4. CONSULTATION

The Department exhibited the 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 1 February and 18 February 2013.

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

4.1 Agency Submissions

The **NSW Office of Water (NOW)** raised initial concerns over the proposal and sought additional information to clarify its potential impacts. NOW's main concerns included consideration of minimal impacts under the Aquifer Interference Policy, potential for subsidence-induced fracturing and increased hydrological connectivity to cause post-mining salinity impacts, cumulative groundwater drawdown at private bores and impacts on groundwater dependent ecosystems.

Wambo has since resolved the majority of these matters to the satisfaction of NOW, although it initially maintained some residual concerns over potential hydrological connectivity and salinity impacts. The Department has therefore assessed these matters in detail, generally to the satisfaction of NOW (see Section 5.2).

The **Office of Environment and Heritage (OEH)** raised concerns over the proposed change in the current subsidence impact performance measure for Wollemi National Park from 'nil' to 'negligible'. As small environmental changes have the potential to impact biodiversity values over a long period, OEH recommended that any modification approval should require baseline assessment and ongoing monitoring to analyse trends in vegetation communities and require the development of appropriate contingency responses.

OEH accepted the EA's Aboriginal Cultural Heritage Assessment and noted that the modification would require amendments to the mine's existing Aboriginal Heritage Impact Permit. OEH expressed concern over the degree of evidence provided to demonstrate sufficient consultation with registered Aboriginal parties, but was satisfied that these matters could be resolved through approval conditions and the provision of additional evidence.

The **Department of Primary Industries** noted that the Agricultural Impact Statement (AIS) adequately addressed soil properties and recommended the adoption of the proposed mine subsidence strategies to enable continued agricultural land use above the longwalls. Wambo's RTS committed to include these measures in the Extraction Plan for Longwalls 9 and 10.

The **Division of Resources and Energy of NSW Trade and Investment** noted that the modification was entirely within existing mining leases held by Wambo and that, should the modification be approved, Wambo would be required to prepare a revised Subsidence Management Plan and Rehabilitation Plan.

The **Environment Protection Authority** noted that it would be able to regulate the impacts of the modified development under Wambo's existing Environmental Protection Licence.

4.2 Special Interest Group Submission

The **Construction, Forestry, Mining and Energy Union** wrote in support of the modification, based on project need, efficient resource recovery and environmental merit.

4.3 Public Submission

A landowner located approximately 750 metres (m) south of the modification area objected to the proposal. This landowner raised concerns with a range of matters including: subsidence impacts on public safety (primarily associated with South Wambo Dam); treatment of a right of way access road; impacts on surface and groundwater resources; the classification of agricultural land resources; consideration of potential noise impacts; disposal of waste material; operation of the CHPP; cultural heritage impacts and the adequacy of community consultation.

These concerns have been considered further in Section 5 of this report.

5. ASSESSMENT

The Department has assessed the EA (see **Appendix C**), submissions on the proposal (see **Appendix D**) and Wambo's RTS (see **Appendix E**) and considers the key issues to be the potential subsidence and water resource impacts of the proposal. Consideration of these impacts is provided below, with further consideration of other impacts provided in **Table 1**.

5.1 Subsidence

Overview

Underground mining commenced at Wambo in 1969. Bord and pillar and longwall mining methods were used in the former Homestead Mine and Wollemi Mine to extract coal from the Whybrow Seam (see **Figure 3**). In 2004, DA 305-7-2003 approved development of the Wambo Coal Mine using multi-seam operations in the Whybrow, Wambo, Arrowfield and Bowfield Seams. Extraction has now ceased in the Whybrow Seam and longwall extraction is currently taking place in the Wambo Seam. Longwall extraction in the Arrowfield and Bowfield Seams has not yet commenced (see **Figure 3**).

The modification proposes two additional longwalls in the Wambo Seam, directly below part of the former Homestead Mine and directly above approved longwall panels in the deeper Arrowfield and Bowfield Seams (see **Figure 3**). Proposed Longwalls 9 and 10 are about 2,000 m long, and are characterised by 1,700 m extraction lengths, 26 m wide chain pillars, 253 m wide extraction faces and an average extraction height of about 2.4 m. Due to the south-westerly dip of the coal seam, the depth of cover above the longwalls varies from a minimum of about 120 m in the northeast to a maximum of about 230 m in the southwest.

Wambo has indicated that, if the current modification is approved, a pillar of coal would be left in Longwall 8 to enable development of the main headings for Longwalls 9 and 10. This pillar would divide Longwall 8 into two sections (Longwalls 8a and 8b) and amend the proposed extraction sequence to Longwall 7, 8a, 9, 10 and finally 8b. Under the existing consent, Longwall 8b contains an exclusion zone (ie another pillar) around the Wambo Homestead, which would still be required and will be managed under the recently-approved Extraction Plan for Longwalls 7 and 8.

The modification EA's Subsidence Impact Assessment (SIA) identifies the area of subsidence as the greater of the 20 mm subsidence contour and a 26.5 degree angle of draw from the longwall panels. This area predominantly occurs within Wambo-owned land and extends beneath the Wambo and Stony Creek alluvials. No significant far-field subsidence impacts are expected to occur as a result of the modification.

The SIA predicts that extraction of Longwalls 9 and 10 would generate a maximum total vertical subsidence of 2,600 millimetres (mm), which is about 15% higher than that predicted and experienced for Longwalls 1-8 (up to 2,250 mm) due to overlying longwall workings in the Whybrow Seam (see **Figure 3**). However, maximum predicted tilts would not vary from those predicted and experienced for Longwalls 1-8 (50 millimetres/metre (mm/m)). Likewise, the SIA predicts that the 95% confidence levels for maximum strains would remain unchanged, at 8 mm/m tensile strain and 10 mm/m compressive strain.

However, since multi-seam mining is approved, these single-seam subsidence parameters are not the critical values. The SIA notes that cumulative subsidence predictions for the North Wambo Underground Mine have been revised in the recently-approved Extraction Plan for Longwalls 7 and 8, to reflect recent monitoring data. This revised calibrated Incremental Profile Model indicates that multi-seam interactions and reactivation of goaf in the overlying Whybrow Seam workings would increase maximum predicted vertical subsidence by 1.0 - 1.6 m, but would not affect maximum tilts and strains. The modification area is therefore predicted to experience maximum vertical subsidence (from previous mining in the Whybrow Seam, current mining in the Wambo Seam, and approved mining in the Arrowfield and Bowfield Seams) of 9,900 mm, similar to that now predicted for Longwalls 1 - 8. Associated tilts are not expected to materially change under the modified layout, with a maximum predicted tilt of 100 mm/m. The locations of maximum subsidence and associated tilts and strains are determined by locations where longwall extraction in all three seams is superimposed, including over parts of Longwalls 9 and 10 (see **Figure 3**).

The Department's usual means of managing the predicted impacts of mine subsidence, following development consent and subject to various performance measures and other conditions, is by conditions requiring the mine to develop and implement a detailed Extraction Plan to the satisfaction of the Director-General. Wambo Coal Mine is already subject to conditions of this type, and extraction of Longwalls 9 and 10 would be subject to the Department's Extraction Plan regime. Key potential subsidence impacts are considered below.

South Wambo Dam

Wambo's South Wambo Dam would experience substantial subsidence from the proposed longwalls (see **Figure 4**). Given that the existing consent already allows for subsidence of this dam, the primary consideration is whether the additional subsidence associated with the modification would further impair its structural integrity or serviceability.

The South Wambo Dam is a large mine water storage which overlies both longwalls (see **Figures 2 and 4**). The SIA predicts that, as a result of the modification and the revised subsidence modelling, this dam would be subject to an increase in maximum vertical subsidence from 6,400 mm to 7,800 mm and an increase in maximum conventional tilts from 40 mm/m to 75 mm/m. Subsidence leads to a risk to loss of stored water from the dam, either through the differential lowering of parts of the dam wall and resultant overtopping and scouring, or by cracking at the base of the dam wall potentially leading to a dam breach.

South Wambo Dam is a prescribed dam under Schedule 1 of the *Dams Safety Act 1978*, which means that approval from the Dams Safety Committee (DSC) is required before Wambo can mine within a set distance of the dam (the DSC's 'notification area'). This important approval is required in order to ensure that underground mining presents no threat to the integrity of the dam or a risk of uncontrolled loss of water, either to the surface environment or to the underground mine workings.

To manage the potential risks, Wambo has stated that it may partially or fully drain stored water before mining near or beneath the dam. The Department notes that, in January 2013, the PAC approved Mod 11 to the mine's consent, which provided for construction of an additional major dam (the Montrose Water Storage). A key reason for this major new dam was to provide capacity to store water drained from South Wambo Dam while it is being undermined.

The Department also notes that the existing consent requires Wambo to design and construct the South Wambo Dam to the satisfaction of the DSC and DRE. It anticipates that the DSC would insist on full dewatering of the dam prior to any mining beneath or near it. If the modification is approved, existing subsidence impact performance measures would also continue to require that all built features (including the dam) remain safe, with no increase in risk to public safety; and that appropriate management strategies are developed for the dam under the required Extraction Plan.

The DSC's existing notification area and the associated requirement for DSC approval for any undermining within that area, together with the existing performance measures and consent requirements, already provide a high level of protection for both the environment and public safety for any mining under or adjacent to Wambo South Dam. Nonetheless, the Department proposes strengthening the existing consent condition to require that the dam is also operated (as well as being designed and constructed) to the satisfaction of DSC and DRE.

Roads

Several unsealed roads traverse the modification area and are expected to experience the full extent of subsidence impacts. These private roads, shown in **Figure 4**, are used primarily for mining operations, with one road above Longwall 10 identified in the EA as also providing a right of way in favour of two private properties, the route of which may be varied on reasonable notice.

Predicted subsidence impacts, such as cracking and heaving, on these road surfaces (particularly the right of way), were raised as a key concern in the public submission. Wambo noted in its RTS that it is already required to maintain these roads in a safe and serviceable condition under performance measures in the existing approval and would manage any such subsidence impacts under the Extraction Plan for Longwalls 9 and 10. Management measures would include visual monitoring during active subsidence and road maintenance measures.

Should any unresolvable risks to public safety arise unexpectedly, Wambo's RTS has committed to vary the right of way route (subject to reasonable notice) to ensure compliance with its obligation to cause no additional risk to public safety.

Other Built Features

A range of additional public and mine-owned infrastructure occurs or near the area of predicted subsidence, including:

- an 11kV powerline (owned by Ausgrid - see Branch 1 in **Figure 4**)
- an 11 kV powerline (owned by Wambo - see Branch 2 in **Figure 4**);
- water pipelines (owned by Wambo);
- exploration bores (owned by Wambo); and
- a range of farm infrastructure, including farm dams and fences (owned by Wambo).

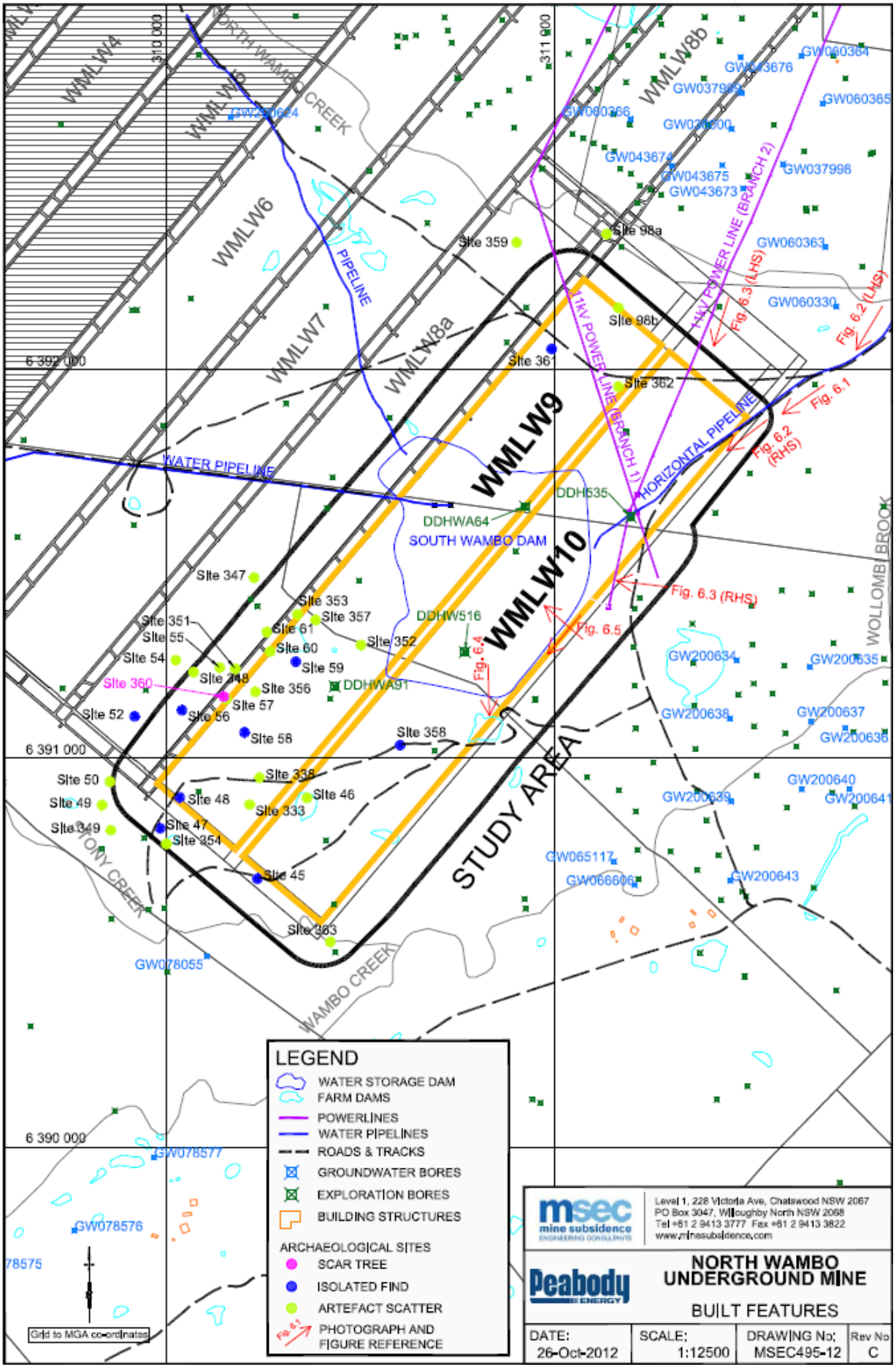

Figure 4 – *Major built features in the modification area*

The SIA notes that the 11kV powerlines would be subjected to a 17% increase in predicted maximum vertical subsidence. However, more significantly, while some localised changes to tilts may occur, the maximum conventional tilt would remain unchanged at 80 mm/m. The SIA notes also that the existing layout already requires mitigation measures to restore any tilting power poles.

The Department notes that the recently approved Extraction Plan for Longwalls 7 and 8 identified that the Ausgrid power line was currently "not in use" and proposed for decommissioning. Should the powerline not be decommissioned, Wambo has committed to prepare an Ausgrid Asset Management Plan, in consultation with Ausgrid, for the management of the affected section of powerline under the relevant Extraction Plans for Longwalls 7 to 10.

Wambo owns a range of additional infrastructure within the potential area of subsidence, associated with both operation of the coal mine and agricultural activities. While this infrastructure is expected to experience a range of subsidence impacts, Wambo has committed to manage these impacts under an Extraction Plan, and where necessary repair or replace any damage to infrastructure in line with existing conditions. This infrastructure includes five small farm dams on land owned by Wambo. The SIA states that these dams are not expected to experience significant serviceability impairments from the predicted subsidence.

Natural Landscape Features

OEH raised concerns over modifying the consent's existing performance measure controlling impacts associated with mine subsidence within the nearby Wollemi National Park, from 'nil impact' to 'negligible impact'. OEH considered that the term 'negligible' was potentially ambiguous and difficult to enforce from a regulatory perspective. It also considered that small environmental changes could lead to potential long term biodiversity impacts, including potential significant impacts on threatened species, populations and communities.

Wambo's RTS noted that, as this performance measure applies to environmental consequences, 'negligible impact' could not lead to a significant impact on any threatened species, populations or community. Wambo also reaffirmed its commitment that the Wollemi National Park escarpment would not be subsided by the extraction of any longwall panels, including the proposed Longwalls 9 and 10. The Department notes that, while subsidence impacts on Wollemi National Park from Longwalls 9 and 10 are very unlikely, modification of this performance measure would apply to the entire North Wambo Underground Mine and should therefore be considered in this broader context.

The Department has only applied a few performance measures requiring 'nil' impact on natural landscape features. Its experience since February 2011, when this performance measure was first introduced to the Wambo consent, is that it is extremely difficult to measure a nil impact from mining at any feature, much less across a landscape, against the background of substantial natural variability in flora and fauna, soils and other landscape features over time. Natural change is caused by variability in rainfall and other climatic events (particularly drought), as well as more extreme events such as bushfires. If sampling density (including baseline monitoring) is sufficiently intense over a sufficient period of time, then a reasonably precise description of change may be able to be identified. However, assigning causation is even more difficult. Assigning firm responsibility as a 'mining-induced' impact in the case of subtle landscape changes (as against more obvious subsidence impacts such as surface cracking) is far from easy.

The Department considers that a 'negligible' impact (to be defined in consent conditions as 'small and unimportant, such as to be not worth considering') is a more appropriate standard against which to monitor, and actually easier to enforce from a regulatory perspective than a 'nil' impact standard. The Department proposes that the existing performance measure requiring 'nil impact' within the Wollemi National Park is revised and clarified to require 'negligible subsidence impacts and negligible environmental consequences'.

In response to OEH's general recommendation for baseline and ongoing monitoring of vegetation communities, Wambo considered that its existing Flora and Fauna Management Plan is already fully sufficient. Under this management plan, Wambo monitors and reports on subsidence impacts within the Remnant Woodland Enhancement Program area (located between the modification area and Wollemi National Park), *Acacia pendula* populations above the existing underground mine and has established control quadrats.

The Department notes that under existing conditions of consent, the Extraction Plan for Longwalls 9 and 10 would contain a Biodiversity Management Plan and that Wambo would also be required to update its existing Flora and Fauna Management Plan for the overall mine.

The Department is satisfied that the amendment of the monitoring and trigger action response plans contained in these documents, in combination with the approval conditions and existing and proposed subsidence impact performance measures, are sufficient to manage the subsidence impacts of the modification.

5.2 Water Resources

The modification area is located within the Lower Wollombi Brook water source and is traversed by Wambo, Stony and North Wambo Creeks. These creeks drain in a generally easterly direction to the nearby Wollombi Brook, which flows northeast to the Hunter River (see **Figure 5**). Two main aquifer systems characterise local groundwater resources, comprising a highly productive alluvial aquifer system which interacts with the surrounding surface creeks, and a less productive and highly saline Permian porous rock aquifer system.

Hydrological connectivity

Extraction of Longwalls 9 and 10 presents a risk of increased hydrological connectivity (especially connective cracking) between creeks and alluvial aquifers and the underlying mine workings. This risk is exacerbated by the existence of the Homestead Mine workings between the surface and the proposed extraction in the Wambo Seam.

The Department notes that similar potential impacts have been identified and addressed under the recently approved Extraction Plan for Longwalls 7 and 8. That plan identified that secondary extraction was likely to generate localised connective fracturing to the surface (or at least, to the base of the alluvium), associated with shallow depths of cover and the presence of former bord and pillar workings in the Homestead Mine in the overlying Whybrow Seam.

To mitigate this potential for connective fracturing and associated water resource impacts for Longwalls 7 and 8, Wambo proposed to fully grout the former Homestead Mine workings wherever the depth of cover to the Wambo Seam was 110 m or less. The Department asked Wambo to further examine the need to grout to a depth of cover of 120 m, since particular Homestead Mine workings lay beneath North Wambo Creek at this depth, and also to consider grouting some Homestead Mine workings beneath longwalls 5 and 6, which have already been extracted. Wambo is currently developing a Grouting Options Paper to examine these proposals, to be reported to the Department by the end of August 2013. On this basis, the Department granted approval for extraction of Longwall 7, with approval for extraction of Longwall 8 to remain contingent on Wambo reaching an agreement with the Department and DRE on the extent of the Grouting Program.

The Department notes that Longwalls 9 and 10 have a minimum depth of cover to the Wambo Seam of at least 120 m, which is considered sufficient to minimise the expression of connective fracturing to the surface. Furthermore, as Longwalls 7 and 8a would be extracted prior to commencement of Longwalls 9 and 10, Wambo would be required to have already established an agreement regarding the necessary extent of grouting in the former Homestead Mine workings. While this extent would act as a minimum grouting limit, if monitoring data from the extraction of Longwalls 7 or 8a indicates additional grouting is required, then this could also be managed under the Extraction Plan for Longwalls 9 and 10.

It is also noted that the main headings for Longwall 9, the only part of the modification area to extend beneath North Wambo Creek, would be designed to mitigate surface subsidence impacts including tilts, strains or fractures. Furthermore, the modification would lead to a pillar remaining within Longwall 8 to permit development of the main headings for Longwalls 9 and 10 which would reduce cumulative subsidence impacts directly beneath North Wambo Creek.

On the basis of the depths of cover above the proposed Longwalls 9 and 10, Wambo's commitment to review its grouting program, minimal subsidence impacts above the main headings and the maintenance of an additional coal pillar in Longwall 8, the Department considers that the modification is unlikely to lead to connective fracturing with the mine beneath North Wambo Creek and its associated alluvium.

The south-westerly dip of the geological strata means that there is an increased depth of cover to the Wambo Seam beneath Stony Creek and its alluvium (between 180 m and 220 m). The EA considered this depth of cover sufficient to prevent both connective fracturing to the surface and associated hydrological connectivity between the Permian coal measures and the Stony Creek alluvial aquifer.

The revised subsidence modelling indicates that the modification would increase vertical subsidence within the Stony Creek alluvium from a maximum of about 6,300 mm to about 8,500 mm, but would not substantially change vertical subsidence directly beneath Stony Creek.

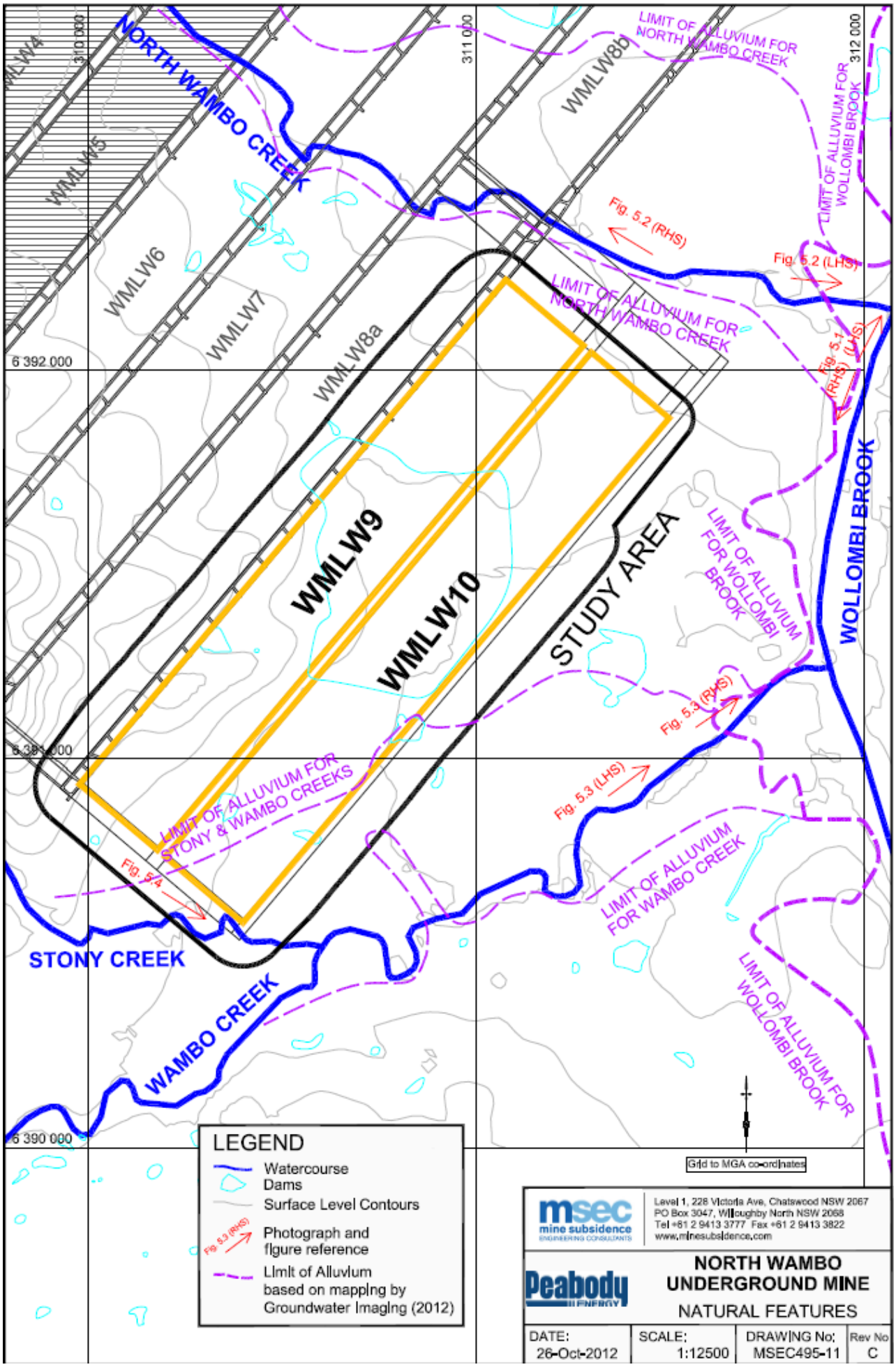

Figure 5 – *Major surface water drainage systems and extent of associated alluvium*

Despite this increased subsidence, maximum predicted tilts and strains would remain unchanged. When considered in conjunction with the depth of cover in this area, the modification is considered unlikely to result in potholing or connective cracking at the base of the alluvium and as such is unlikely to require grouting of the former Homestead Workings below Stony Creek.

The NOW submission raised concerns that subsidence-induced fracturing above the additional longwalls resulting in increased hydrological connectivity between the alluvium and the mine could lead to the risk over time of potential upwelling of saline water from the deeper Permian coal measures into the overlying alluvial aquifer and surface water drainages. Wambo's RTS maintained that net groundwater fluxes would be sufficient to prevent upwelling of saline water into the alluvial aquifers. Consequently, the Department sought additional information from both NOW and Wambo.

NOW clarified that it was primarily concerned over potential long-term salinity effects, following the re-equilibration of post-mining groundwater levels and continued upward pressure gradients in the coal seams due to recharge in the nearby elevated hills (see **Figure 6**). NOW sought quantification of the likelihood that increased fracturing would reduce natural permeability barriers and exacerbate the potential for long-term upward saline discharge into the alluvial aquifer and surface water drainage features. NOW recommended that, should the modification be approved, Wambo be required to periodically update its groundwater model to progressively improve the connectivity modelling and provide for adaptive management of water resource impacts.

Wambo's response provided clarification of the regional geological setting and conceptualised groundwater model and identified that, while some localised fluctuations in pressure gradients were predicted, the modification would generate an average downward groundwater flux and recharge from the unconfined alluvium into the underlying rock strata (see **Figure 6**). Modelling of post-mining groundwater recovery identified that the long-term equilibrium groundwater levels would be slightly lower than pre-mining levels and that any increase in permeability would not result in a long-term discharge of saline groundwater to the alluvial system.

The Department notes that, under its existing consent, Wambo is required to undertake surface and groundwater monitoring to the satisfaction of EPA, NOW and the Director-General. This condition includes monitoring of regional groundwater levels and quality in the alluvial and overburden aquifers during the life of the development and for at least 10 years after mining.

The consent also requires Wambo to develop and apply a groundwater monitoring program, including collection of baseline data on groundwater levels and quality and ongoing monitoring and reporting on groundwater quality, including water levels, pH and electrical conductivity. Should the modification be approved, Wambo would also be required to develop, as part of the Extraction Plan for Longwalls 9 and 10, a Water Management Plan, in consultation with the EPA and NOW.

The consent also requires a Surface and Groundwater Response Plan which aims to quantify any effect of the open cut and underground workings on surface and groundwater resources and incorporates trigger values for the implementation of adaptive management and mitigation approaches. The Department notes this plan also includes long-term monitoring of direct hydraulic connection between the backfilled open cut and the North Wambo Creek alluvium.

Further, Wambo is required to update these plans within three months of any modification, to the satisfaction of the Director-General.

It is also important to note that the two new longwalls provide almost no capacity, in themselves, to lead to the outcome that NOW has expressed concern over. Longwalls 9 and 10 are two relatively small longwalls, set within a very much larger multi-seam mining environment (see **Figure 3**). Extraction has already taken place in the Woodlands Hill Seam and the Whybrow Seam. Longwalls 9 and 10 would complete Wambo's extraction within the Wambo Seam. Future extraction from the underlying Arrowfield and Bowfield Seams has also been approved to take place. Each of these mine workings would need to fill with saline groundwater before any potential for further upwelling into the alluvium could possibly eventuate. As well, the nearby Wambo Open Cut provides a very substantial store (and potential long-term sink) for saline groundwater.

Given the above, the Department accepts that the modification is unlikely to significantly increase the risk of long-term salinity impacts on overlying alluvial and surface water sources and is satisfied that incremental impacts can be managed through review and development of the existing monitoring, management and response plans. The Department is satisfied that the consent already contains appropriate requirements for the monitoring and adaptive management of groundwater impacts arising from the development more broadly, and the modification in particular.

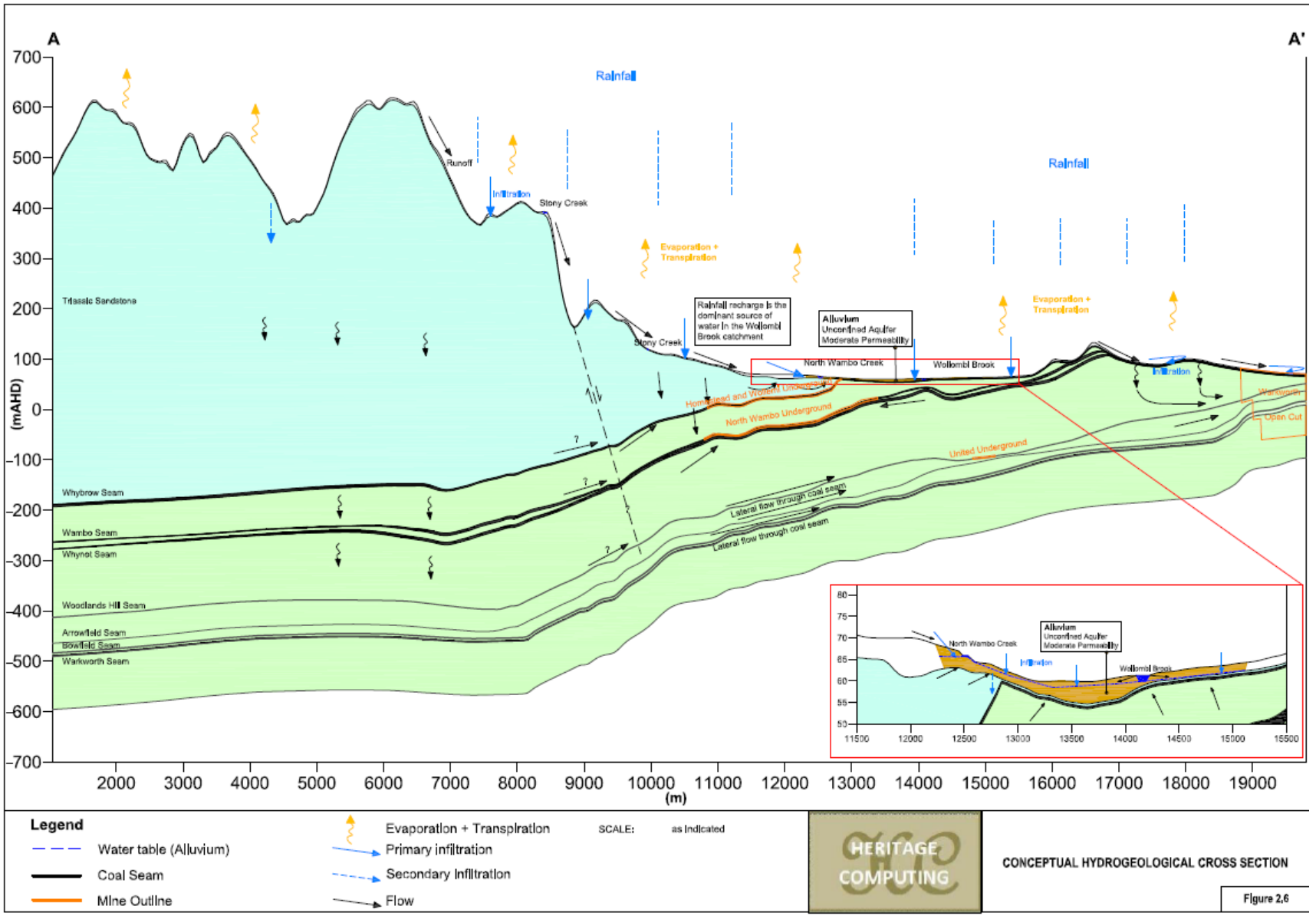

Figure 6 – *Cross section of modification area showing indicative groundwater flows*

However, the Department will require Wambo to update its existing groundwater model to address the modification, and ensure that it deals comprehensively with current and future risks of upwelling saline groundwater impacting surface water and alluvial groundwater resources, in respect of the broader Wambo Coal Mine.

The Department has consulted NOW and it is satisfied that the Department's recommendation sufficiently addresses its residual concerns and recommendations for ongoing monitoring.

Potential impacts on reliable water resources
NOW's submission sought clarification as to whether the modification would comply with the Government's new Aquifer Interference Policy (AIP). Specifically, NOW sought confirmation of the proximity of the longwalls to the three dimensional extent of the Wollombi Brook Alluvial Aquifer, the potential for cumulative drawdown impacts exceeding 2 m at nearby private groundwater bores and the potential for salinity impacts on the alluvial aquifer and surface water resources, and whether the modification satisfied the AIP's minimal impact requirements.

Wambo's RTS provided additional confirmation that the modification was outside the three dimensional exclusion zone for mining activities near a reliable water supply and that no groundwater bores would experience cumulative groundwater drawdown exceeding 2 m. Based on this additional information, NOW acknowledged that the modification satisfied the AIP's Level 1 minimal impact requirements.

The consent already contains a subsidence impact performance measure requiring negligible impacts on the Wollombi Brook. The Department is satisfied that the modification is unlikely to significantly increase the hydrological connectivity or salinity impacts below the alluvium of Wollombi Brook or its tributaries, beyond that permitted under the existing consent.

However, to further mitigate the potential for unforeseen impacts on water sources, the Department supports NOW's recommendation that Wambo further develop its monitoring and contingency plans. It is satisfied that these amendments can be managed through the consent's requirement to review the existing Surface Water and Groundwater Management Plans.

Drawdown impacts and groundwater bores
NOW initially sought clarification of the modification's potential groundwater drawdown impacts. NOW was satisfied with Wambo's RTS, which confirmed that cumulative groundwater drawdown would not exceed 2 m at any nearby private groundwater bore and that existing 'make good' provisions were sufficient to address any unforeseen drawdown impacts associated with depressurisation of the Permian coal measures.

Groundwater modelling indicates that the modification would marginally increase groundwater losses from alluvial water sources to an average of 3.45 ML/annum and groundwater take from porous hard rock aquifers to an average of 241 ML/annum. NOW has confirmed that Wambo holds sufficient groundwater licences to service this take, in line with the Aquifer Interference Policy.

The Department notes that two of Wambo's porous rock extraction licences are scheduled to expire prior to the commencement of Longwalls 9 and 10. However, Wambo has indicated that renewal of these licenses has been requested. Consequently, the Department is satisfied that Wambo currently holds sufficient water licences to service the modification.

Groundwater Dependent Ecosystems (GDEs)
In its RTS, Wambo identified that one potentially groundwater dependent vegetation community occurs in the modification area, but was unlikely to be significantly impacted. Given the limited changes to groundwater impacts associated with the modification and NOW's identification that this ecosystem is not currently classified as a high priority GDE under the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009*. The Department is satisfied that the modification is unlikely to significantly impact on identified groundwater dependent ecosystems.

Conclusion
The Department recognises that both the existing and modified mine layout will result in subsidence induced fracturing and increased hydrological connectivity. Under its consent Wambo is already required to address these impacts through ongoing surface and groundwater monitoring and the development of a Surface and Groundwater Response Plan, including trigger values and impact response plans, as requested by NOW.

The Department is satisfied that the modification would not significantly change the surface and groundwater impacts of the development as approved and that the incremental impacts can be managed through amendments to the existing management and response plans.

5.3 Other impacts

The Department is satisfied that the other impacts of the proposed modification are likely to be minor. The assessment of other impacts is summarised in **Table 1** below.

***Table 1** - Assessment of other impacts*

Issue	Consideration and Assessment	Recommendation
Agriculture	• The modification area underlies areas of Wambo-owned agricultural land, used primarily for beef cattle grazing on unimproved rain-fed pasture. • Potential impacts on agricultural resources include subsidence, ponding, clearing for dewatering bores and risks of injury to people or livestock. • Wambo has committed to include subsidence mitigation measures identified in the Agricultural Resource Assessment (ARA) in its Extraction Plan for Longwalls 9 and 10. These measures would allow continued use of agricultural land above the longwall panels and include provisions for the remediation of any significant surface cracking which may present an animal or human safety hazard. • The ARA also included an assessment of potential impacts on indicative Strategic Agricultural Land, as mapped under the Upper Hunter Strategic Regional Land Use Policy (SRLUP, see **Figure 7**). • Site verification undertaken as part of the ARA identified that land capabilities within the modification area were insufficient to meet the criteria for Biophysical Strategic Agricultural Land. • The ARA also identified that the modification area was at least 12 km southeast of the nearest mapped equine critical industry cluster (CIC) and, with the exception of a brief period around 1905, has not been used for thoroughbred breeding. The Department is satisfied that this land does not constitute part of the Upper Hunter equine CIC. • The ARA recognised that the modification area lay within the SRLUP's mapped indicative viticulture CIC (see Figure 7), but noted that there was no historical or site-specific evidence of vineyards or viticulture practices. • The Department has considered the modification against relevant criteria under the draft *SEPP (Mining, Petroleum Production and Extractive Industries) Amendment 2012*, and is satisfied that the modification is unlikely to have a significant impact on surface disturbance or cumulative subsidence impacts; reduce access to support services and infrastructure or transport routes; or result in the loss of scenic and landscape values. • The Department is satisfied that the modification would not significantly impact on agricultural resources or Strategic Agricultural Land, and can be managed under the appropriately required Extraction Plan.	No additional conditions necessary.
Biodiversity	• Flora surveys of the modification area did not identify any threatened flora species or populations, but did identify two endangered ecological communities (*Hunter Lowland Redgum Forest* and *Central Hunter Grey Box – Ironbark Woodland*) and one vulnerable ecological community (*Hunter Valley Footslopes Slaty Gum Woodland*). • The EA identifies that native vegetation (including these threatened ecological communities) within the modification area would be subject to the full extent of subsidence impacts. However, potential biodiversity impacts would be largely restricted to the effects of subsidence on landscape characteristics. • Subsidence is considered unlikely to lead to ponding or drainage impacts that would significantly affect these communities. • The modification does not require surface clearing for gas drainage infrastructure. Development of dewatering bores would be limited to previously disturbed grazing pasture. The Department is satisfied that this disturbance would have negligible environmental impacts and can be appropriately managed under Wambo's existing Vegetation Clearance Protocol and Flora and Fauna Management Plan. • The Department is satisfied that the modification would not significantly impact on the biodiversity values of the area and can be appropriately managed under Wambo's existing Flora and Fauna Management Strategy.	No additional conditions necessary.
Noise	• A community objection was received concerning potential noise impacts. The Department notes that the objector's residence is about 750 m from the modification area and substantially further from operational areas of the existing open cut mine and CHPP. • The great majority of the proposed modification would take place underground, with surface construction activities limited to development of dewatering bores. As such, significant changes to the existing approved	No additional conditions necessary.

Issue	Consideration and Assessment	Recommendation
	noise impacts at the objector's property are unlikely. • The Department is satisfied that noise impacts can be managed under existing consent conditions.	
Waste Material	• The modification would produce an additional 0.7 Mt of coarse rejects and 0.4 Mt of tailings, which would be disposed of under existing approved arrangements.	No additional conditions necessary.
Surface Infrastructure	• The Department sought additional information to clarify Wambo's proposal to extend the existing gas management system for monitoring and control of mine gases, without the need for additional surface disturbance. • Wambo confirmed that it proposed to use the mine's underground ventilation system to manage mine gases at the active mine face, through Longwall Minegate Back Return methods, and would not require any surface or in-seam drilling for pre-mining or post-mining (goaf) gas drainage. • The Department is satisfied that mine gases can be managed through an extension of the existing underground gas management system.	No additional conditions necessary.
Aboriginal Heritage	• The Cultural Heritage Impact Assessment identified several previously known and newly identified Aboriginal objects within the modification area. • Wambo has committed to extending its existing Aboriginal Heritage Impact Permit (AHIP No 2222) to include the modification area. • Wambo Considered that its consultation with local Aboriginal stakeholders was compliant with relevant OEA regulations and that additional consultation was not necessary for the modification or associated revisions to the existing Heritage Management Plan. OEH is satisfied that this matter can be managed through the demonstration of appropriate evidence of consultation for post-approval amendments to the existing Heritage Management Plan and AHIP No 2222. • The Department is satisfied that impacts to Aboriginal objects can be appropriately managed in line with existing practices at the North Wambo Underground Mine and through amendments to the existing Heritage Management Plan and AHIP No 2222.	No additional conditions necessary.
Cultural Heritage	• The modification main headings would encroach within the Wambo Homestead Complex Curtilage, but would remain well outside the Wambo Homestead Exclusion Zone. The Heritage Council has recently granted approval for Longwalls 9 and 10 within the Wambo Homestead curtilage. • The Department is satisfied that the modification would have negligible additional impacts on the heritage values of Wambo Homestead Complex and can be managed through amendments to the existing Heritage Management Plans.	No additional conditions necessary.
Air Quality & Greenhouse Gas	• The Department is satisfied that the modification would have minimal air quality and greenhouse gas impacts and that these impacts can be managed through amendments to the mine's Air Quality and Greenhouse Gas Management Plan.	No additional conditions necessary.
Social and Economic Impacts	• The modification would utilise the existing North Wambo Underground operational workforce and equipment to optimise coal resource recovery in the Wambo Seam, in an area subject to previously approved underground mining activities. It is expected to lead to minimal additional impacts on nearby receivers. • The modification would allow the recovery of an additional 3.7 Mt of ROM coal, provide continued employment for the existing 842 Wambo Underground Mine employees and contractors, provide continuing State and Commonwealth taxes and royalties, and efficiently recover State-owned mineral resources that would otherwise be sterilised.	No additional conditions necessary.

6. RECOMMENDED CONDITIONS

The Department has drafted a recommended notice of modification (see **Appendix A**) for the proposal as well as a consolidated version of the consent as it is proposed to be modified (see **Appendix B**). These conditions require Wambo to update its existing management plans and ensure negligible subsidence within Wollemi National Park.

Wambo has reviewed the proposed conditions, and does not object to their imposition.

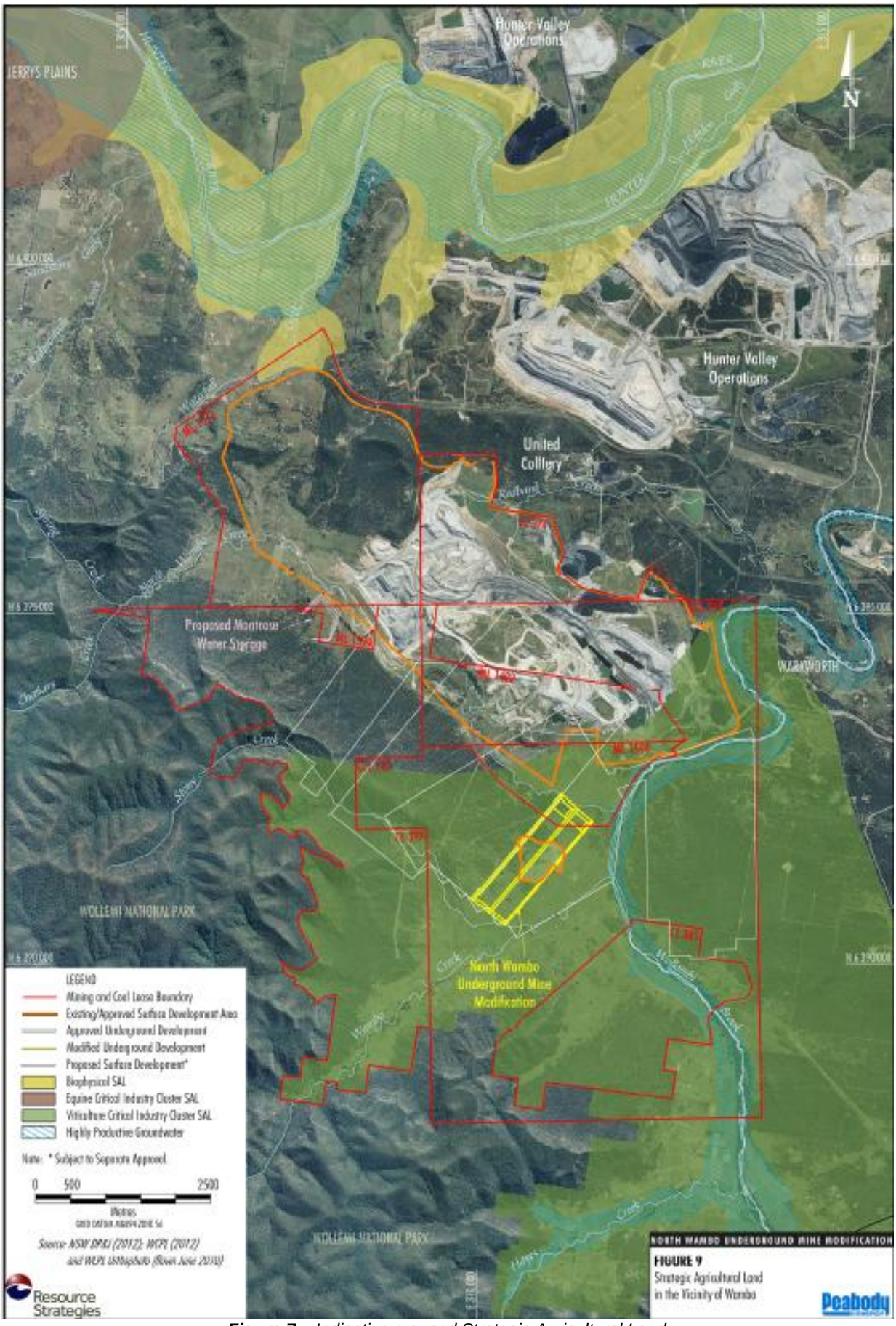

Figure 7 – *Indicative mapped Strategic Agricultural Land*

CONCLUSION

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

This assessment has shown that, with the implementation of suitable mitigation measures under existing and proposed management plans, the proposed modification can be carried out with an acceptable environmental impact. The Department has drafted conditions to reflect the proposed modification and update other conditions of consent.

The Department is satisfied that the proposed modification is in the public interest and should be approved, subject to conditions.

7. RECOMMENDATION

It is recommended that the Planning Assessment Commission (PAC), as delegate of the Minister:

- **considers** the findings and recommendations of this report;
- **determines** that the modification is within the scope of section 75W of the EP&A Act;
- **approves** the modification application, under section 75W, subject to conditions; and
- **signs** the notice of modification at **Appendix A**.

Howard Reed 28.6.13

Howard Reed
Manager
Mining Projects

DKitto 1/7/13

David Kitto
Director
Mining and Industry Projects

APPENDIX A – NOTICE OF MODIFICATION

APPENDIX B – CONSOLIDATED DEVELOPMENT CONSENT AS PROPOSED TO BE MODIFIED

APPENDIX C – ENVIRONMENTAL ASSESSMENT

APPENDIX D – SUBMISSIONS

APPENDIX E – RESPONSE TO SUBMISSIONS