RAVENSWORTH OPERATIONS PROJECT
Narama West Open Cut Modification (MP 09_0176 Mod 1)

1 BACKGROUND

Ravensworth Operations Pty Ltd, a wholly owned subsidiary of Xstrata Coal Pty Ltd (Xstrata), operates the Ravensworth mine complex, located approximately 15 kilometres (km) northwest of Singleton and 17 km southeast of Muswellbrook, in the Singleton local government area of the Upper Hunter Valley (see Figure 1).

Figure 1: *Location of the Ravensworth Mine Complex*

The mine complex includes both open cut and underground coal mining operations, which are regulated under 2 key approvals.

Open cut mining operations, and surface facilities associated with the Ravensworth Underground Mine, are regulated under a Ministerial approval (MP 09_0176) granted by the then Minister for Planning on 11 February 2011. The approval for this project, known as the Ravensworth Operations Project, consolidated and replaced numerous development consents and project approvals regulating open cut mining operations and surface activities since 1990, including:

- Ravensworth West open cut mine (DA 165/97);
- Narama open cut mine (DA 135/90);
- Cumnock No. 1 open cut and underground mine (DA 123/05/01 and DA 169/96);
- surface operations associated with the Ravensworth Underground Mine (DA 161-7-2005); and
- Ravensworth Coal Terminal (1982 DA).

Underground mining operations at the Ravensworth Underground Mine are regulated under DA 104/96, which was approved by the then Minister for Urban Affairs and Planning on 20 November 1996. This approval has since been modified on 9 occasions, with the latest approved in June 2013.

Under these approvals, Xstrata is allowed to extract up to 21 Mt of run-of-mine (ROM) coal a year from the Ravensworth mine complex, including up to 16 Mt from the open cut operations and up to 7 Mt from the underground operations[1]. Extracted coal is transported to a coal crushing plant prior to being conveyed to neighbouring power generation facilities or in the case of export coal is conveyed to the Ravensworth Coal Handling and Preparation Plant (CHPP) for further processing prior to being railed to the Port of Newcastle.

The Narama open cut mine (now part of the Ravensworth Operations Project) has been operating since the early 1990s, and its coal resource is almost exhausted. The approval for the Ravensworth Operations Project allows a small extension to the mine at its eastern end, as shown on Figure 2. Since the Minister's approval of the Ravensworth Operations Project, Xstrata has identified some additional economical coal resources at the western end of the Narama mine which Xstrata now proposes to extract, and which forms the main basis of the current modification application.

The 'Narama West' mining area covers approximately 89 hectares, and is located on land that has been disturbed and rehabilitated by previous mining activities at the mine complex. It is also primarily within the footprint of an approved overburden emplacement area for the Ravensworth Operations Project (see Figure 3), which is yet to be developed.

The area surrounding the Ravensworth mine complex is dominated by coal mining, particularly other Xstrata mines such as the Mount Owen Complex and Liddell Coal Mine. Macquarie Generation's Bayswater and Liddell power stations are located about 5 km to the north. A number of private rural residences are located to the east and south-east of mine complex, with the majority located at Camberwell Village, which is approximately 2 km from the approved operations boundary and 6 km from the proposed Narama West mining area.

2 PROPOSED MODIFICATION

Xstrata is proposing to modify the project approval for the Ravensworth Operations Project to allow the development of the Narama West mining area (see Figures 3 and 4). This proposal would provide the opportunity for a valuable coal resource to be extracted, prior to the subject area being used for overburden emplacement and subsequently rehabilitated, as required under the existing conditions of approval.

The proposal involves:

- extracting and processing 2.7 Mt of ROM coal over a period of about 2 years using truck and shovel or dragline mining methods; and
- transporting and processing the coal for domestic or export use in accordance with the existing arrangements at the mine complex.

[1] Total extraction from the open cut and underground operations must be managed so as to keep below the 21 Mt mine complex maximum.

The modification would not extend the life of the Ravensworth Operations Project beyond its December 2039 approval period, nor would it exceed the approved maximum extraction limit of 16 Mtpa of ROM coal. Proposed mining operations would commence in 2013.

Following completion of mining in the Narama West extension area, the mine void would be backfilled, used for overburden emplacement and rehabilitated in accordance with the existing conditions of approval.

Xstrata is also proposing to make some unrelated administrative and other amendments to the project approval, including:

- increasing the maximum blast vibration criterion at Aboriginal grinding groove site 'REA86';
- additional blast management commitments to reflect an agreement with Coal & Allied, which operates the adjacent Hunter Valley Operations (HVO) mine;
- a minor amendment to the project boundary to include the Newdell substation (see Figure 5); and
- removing the specific Aboriginal archaeologist named in the statement of commitments.

The proposed modification is outlined in Xstrata's supporting Environmental Assessment (EA), attached in **Appendix C**.

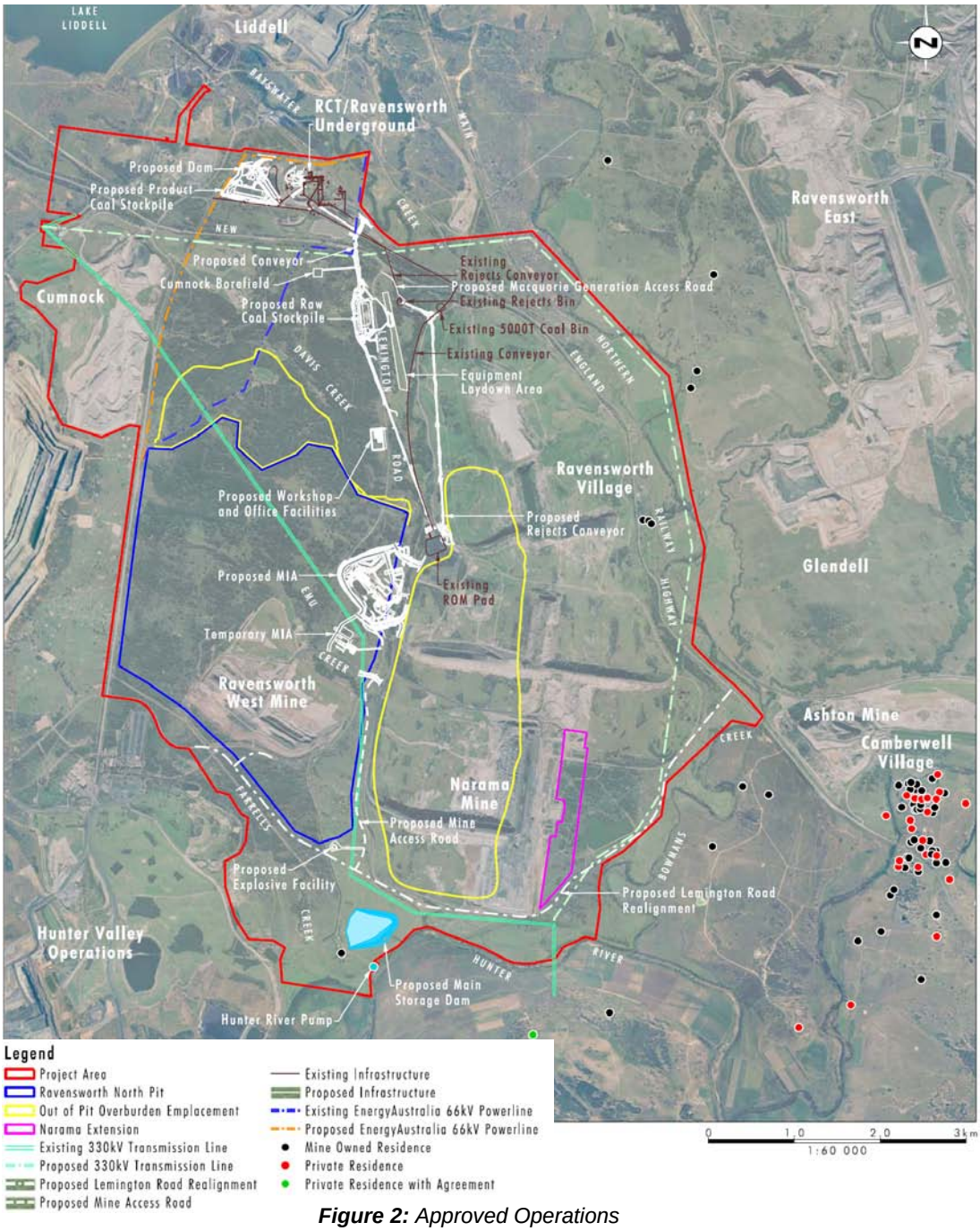

Figure 2: *Approved Operations*

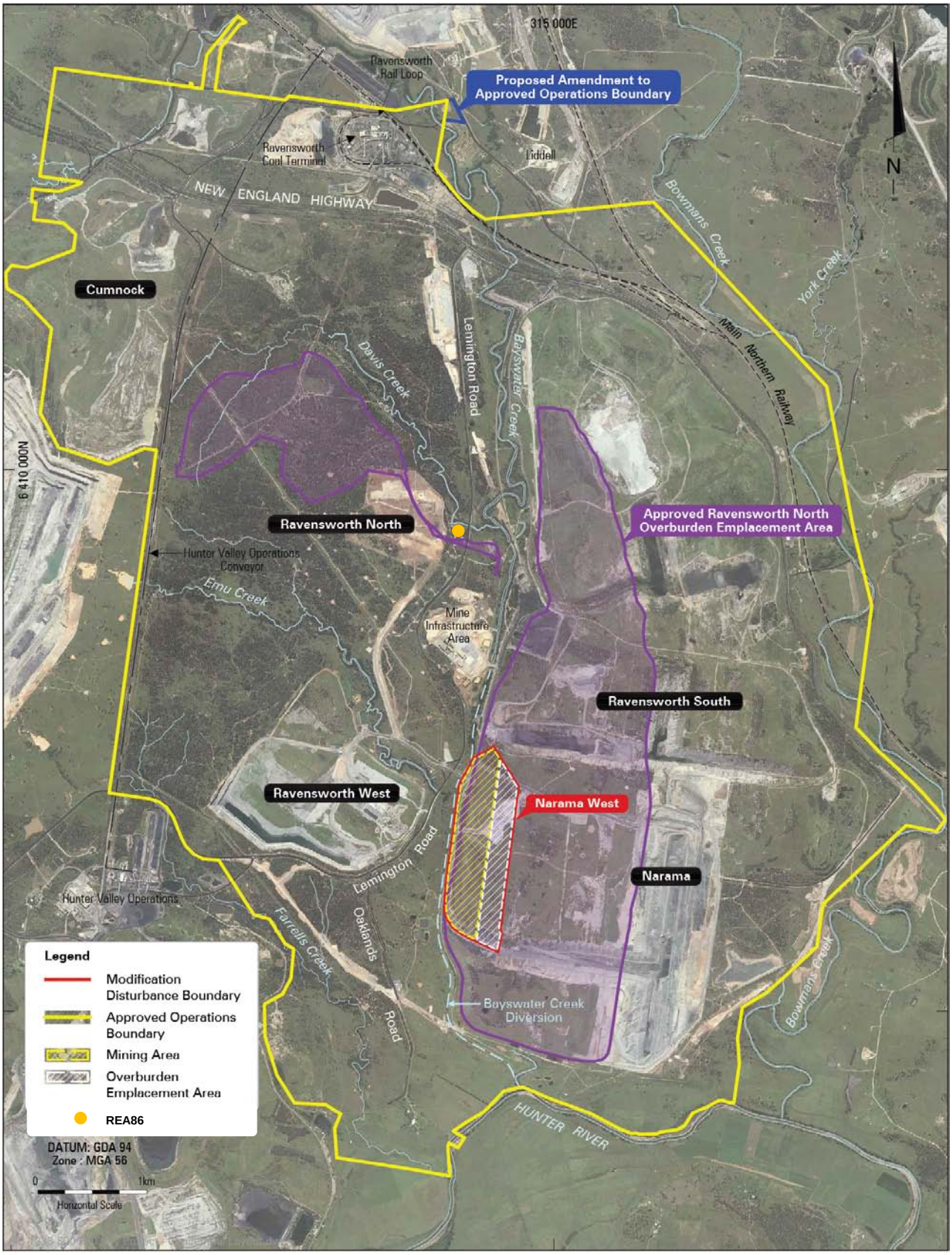

Figure 3: *Proposed Narama West Modification*

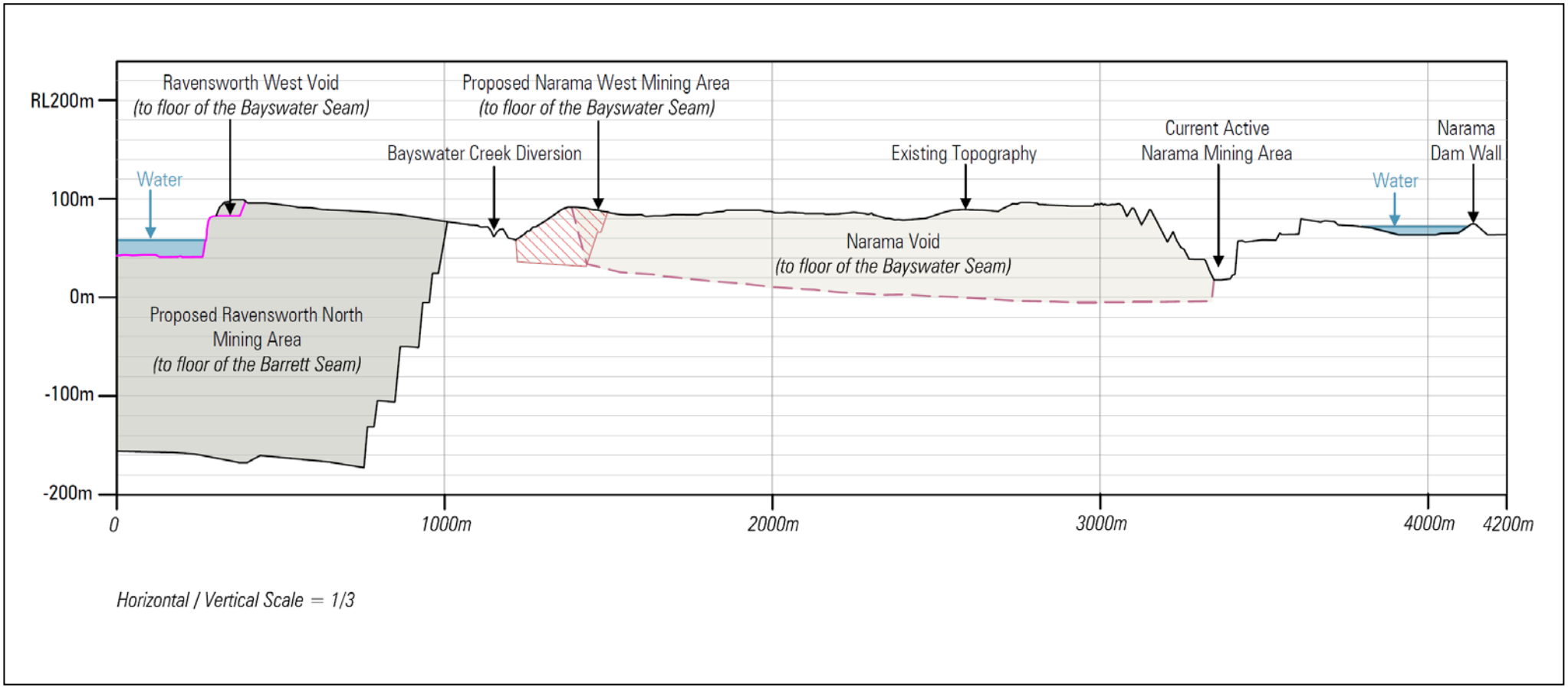

Figure 4: *Proposed Narama West Mining Area Cross Section*

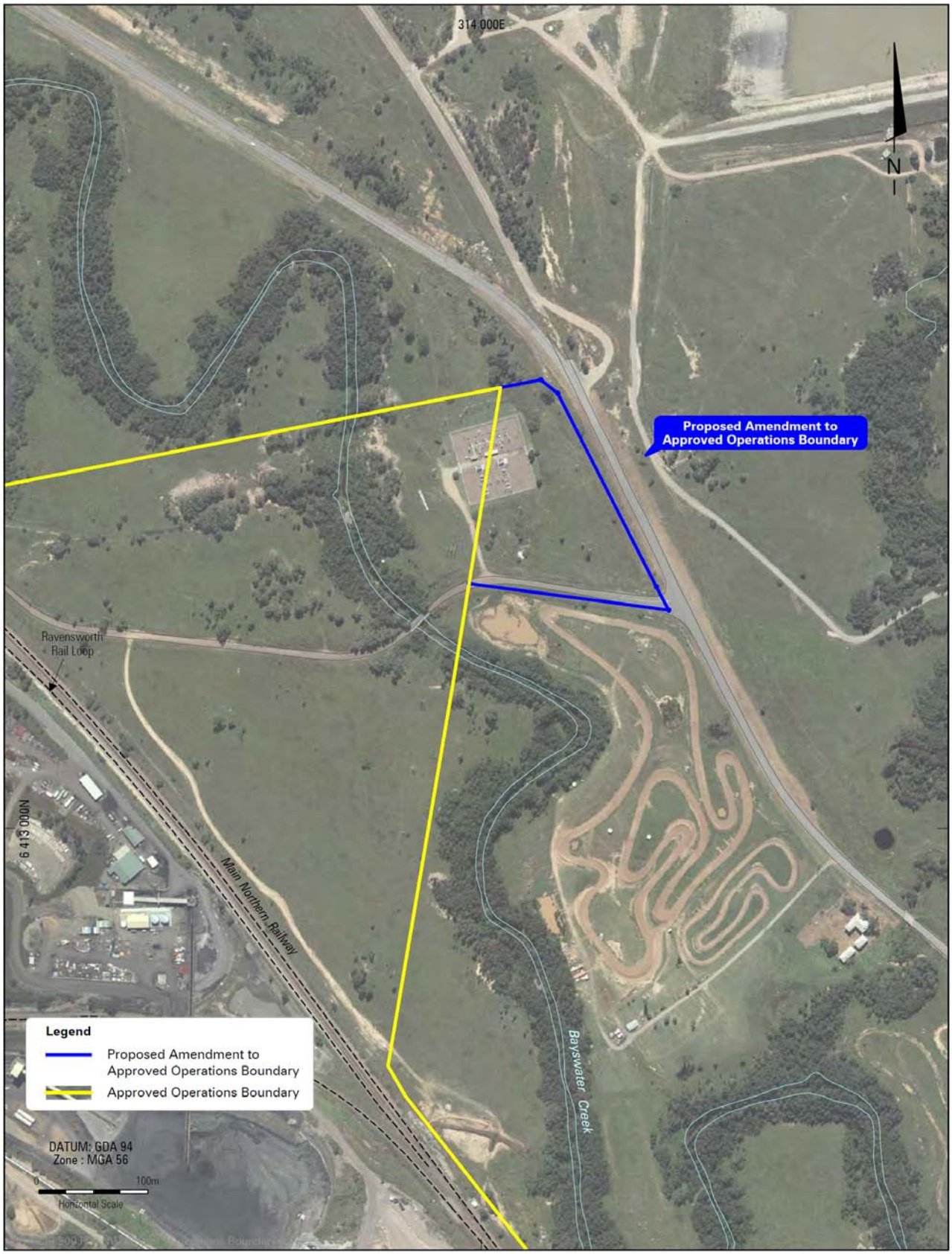

Figure 5: *Proposed Amendment to Project Boundary*

3

STATUTORY CONTEXT

3.1 Section 75W

The Ravensworth Operations Project was approved under the former Part 3A of the *Environmental Planning and Assessment Act* 1979 (EP&A Act). Although Part 3A was repealed on 11 October 2011, the project remains a "transitional Part 3A project" under Schedule 6A of the EP&A Act. The proposed modification is therefore required to be considered under the Section 75W of the EP&A Act, in accordance with the relevant savings provisions.

3.2 Approval Authority

The Minister for Planning and Infrastructure is the approval authority for the modification application. However, under the Minister's delegation of 14 September 2011, the Executive Director, Development Assessment Systems and Approvals, may determine the application. This is because no public submissions were received, Xstrata did not make any reportable political donations and Singleton Council raised no objections to the proposal.

3.3 Modification

The Department is satisfied that the proposal can be characterised as a modification to the original approval rather than a new project in its own right, because:

- the additional coal to be recovered is a small fraction of Xstrata's annual and total approved coal production and would be processed in accordance with existing approved operations;
- the disturbance footprint for the Narama West extension is within the approved operations boundary, and primarily within the footprint of an approved overburden emplacement area;
- the proposed change to the project boundary is minor; and
- the project as modified would be substantially the same as the originally approved project.

Consequently, the Department is satisfied that that the proposed modification is within the scope of Section 75W of the EP&A Act.

3.4 Environmental Planning Instruments

The Department has considered the proposal against the relevant environmental planning instruments, and is satisfied than none of these instruments substantially govern the carrying out of the proposal.

4 CONSULTATION

Under Section 75W of the EP&A Act the Department is not required to exhibit the modification application. However, after accepting the application the Department referred it to the relevant government agencies for comment and made it publicly available on its website from 5 April 2013.

The Department received comments from 5 government agencies, none of which object to the proposal. A summary of the submissions is provided below, and full copies are provided in **Appendix D**. No representations from the general public were received during the course of the assessment process.

The **Office of Environment & Heritage** (OEH) raised some issues in relation to Aboriginal cultural heritage and requested additional information on Xstrata's proposal to amend the project boundary and to increase the maximum blast vibration criterion at the Aboriginal axe grinding groove site. OEH also requested further details in relation to the sighting of a threatened bird species near the Narama West site. In response, Xstrata carried out additional studies and literature reviews in consultation with OEH, and OEH later confirmed that it was satisfied with the additional information.

The **NSW Office of Water** (NOW) initially raised some issues in relation to water resources and requested that Xstrata: classify the groundwater model used in its EA based on the *Australian Groundwater Modelling Guidelines*; confirm it would have a sufficient water take licence to account for inflows into the Narama West mine void; and provide more information on potential impacts on baseflow. NOW also requested that groundwater quality for the highly productive Hunter River Alluvium be considered in accordance with the *Aquifer Interference Policy*. Following the provision

of additional information from Xstrata, NOW confirmed that it was satisfied that these issues have been, or could be, adequately addressed.

The **Division of Resources and Energy** (DRE) and the **Environment Protection Authority** (EPA) raised no issues, and made general recommendations about the proposed modification. **Singleton Council** raised no issues.

Xstrata has addressed the issues raised by OEH and NOW in a formal response, and agreed to the recommendations made by DRE and EPA (see **Appendix E**). The Department has subsequently considered all issues raised throughout the assessment process, and Xstrata's response to these issues, in its assessment of the proposed modification.

5 ASSESSMENT

In assessing the merits of the proposal, the Department has considered:

- the EA for the original project;
- the existing conditions of approval;
- the EA, submissions and response to submissions;
- relevant environmental planning instruments, policies and guidelines; and
- the objects of the EP&A Act.

Based on its assessment, the Department is satisfied that all potential impacts resulting from the modification would be relatively minor and could be appropriately managed. The Department's assessment of each of the components of the modification is summarised below.

5.1 Narama West Extension

Groundwater

The EA includes a specialist groundwater impact assessment undertaken by Australasian Groundwater and Environmental Consultants Pty Limited. Due to the low risk associated with the proposed modification, a simplistic two dimensional model (SEEP/W model) was deemed suitable for the proposal. In response to NOW's comments regarding the model classification, Xstrata confirmed that the model is a 'class 1' model under the *Australian Groundwater Modelling Guidelines,* and that the scope of the modelling was established in consultation with NOW at a meeting on 20 November 2012. NOW has since confirmed that it accepts the scope of the modelling.

The assessment identified that the existing Narama mine has already largely depressurised and drained the Permian coal seam aquifer within the Narama West mining area, leaving it predominantly unsaturated and dry. This corresponds with the groundwater levels inferred from measurements in surrounding bores, the structure of the coal seam and historical mining data.

The regional aquifer would be further depressurised by the much larger Ravensworth North Pit, approved as part of the Ravensworth Operations Project (see Figure 2). Groundwater modelling for the Ravensworth Operations Project found that the Ravensworth North Pit would drawdown groundwater levels up to 170 metres below pre-mining levels. Based on this predicted drawdown, the aquifers within the Narama West mining area would therefore be fully dewatered and depressurised from the approved mining activities under the Ravensworth Operations Project, and the Narama West mining area would not have any significant additional or cumulative impact on regional groundwater levels in the area.

The modelling found that the groundwater seepage rate from the Permian coal measures into the Narama West mining area would be approximately 0.02 ML/day, or 7.3 ML/year. This volume of water would either evaporate or be bound as moisture in the coal and overburden, and therefore would not accumulate in the base of the pits. The groundwater assessment also notes that Xstrata has existing water entitlements for the Ravensworth Operations Project under the *Water Act 1912* (Water Act) totalling about 3,396 ML/year for groundwater seepage from the Permian strata, with 150 ML/year attributed to the Narama mining area.

Given the relatively small predicted inflows associated with the proposed modification, the fact that the water inflows would be overshadowed by the much larger approved Ravensworth North Pit, and Xstrata's existing water entitlements for the Narama and wider mining operations, the Department is

satisfied that Xstrata would be able to fully account for the water inflows attributable to the proposal, and that the proposal would not adversely affect regional groundwater resources and water sharing in the locality.

The Department notes that the existing conditions of approval require Xstrata to ensure that it has sufficient water for all stages of the project and, if necessary, to adjust the scale of mining operations to match its available water supply. The conditions also require Xstrata to maintain a detailed Site Water Balance for the project, including details of all water use associated with the project. The Department is satisfied that these existing conditions would adequately address any additional inflows from the proposed Narama West operations.

NOW has requested that Xstrata be required to request additional entitlements to account for the additional inflows prior to mining in Narama West. The Department notes that the existing conditions already require Xstrata to review (and if necessary update) the Site Water Balance to accommodate the proposed modification, as well as the abovementioned condition requiring Xstrata to ensure it has sufficient water for all stages of the project. The Department is satisfied that these conditions, along with Xstrata's general statutory obligations under the Water Act and *Water Management Act 2000* (WM Act), adequately address NOW's request.

The groundwater assessment also includes consideration of the potential impacts on alluvial water sources, noting that historical mining operations at Narama have already removed the alluvium associated with the original alignment of Bayswater Creek, which originally traversed through the Narama mining area. As part of these historical mining operations, Bayswater Creek has been diverted to a channel to the west of the proposed Narama West mining area (and to the east of the approved Ravensworth North mining area), as shown on Figure 3. There is no notable baseflow in Bayswater Creek as the alluvium along the creek has largely been removed by previous mining.

The groundwater assessment noted that modelling undertaken for the Ravensworth Operations Project found that the Ravensworth North Pit would result in some additional transfer of water from the remaining alluvium to underlying Permian strata, however this would not have any impact on the Hunter River alluvium further to the south. As the proposed Narama West mining area contains only a very limited volume of groundwater, the assessment found that it would have a negligible impact on the alluvial water source in the area, and that any losses would be consistent with those predicted for the approved operations.

NOW did not object to these conclusions, but requested that Xstrata addresses the minimal impact considerations of the *Aquifer Interference Policy* with respect to groundwater quality. Xstrata subsequently confirmed that the proposal would be unlikely to result in any change to the beneficial use category of the relevant groundwater sources, and that any impact associated with the proposal would be unlikely to exceed the minimal impact considerations in respect to water quality.

Overall, the Department is satisfied that the proposed modification would have minimal additional impacts on groundwater above and beyond those already approved for the Ravensworth Operations Project, including the much larger Ravensworth North Pit. The Department is satisfied that the existing conditions of approval are adequate to accommodate and address the Narama West mining operations. In accordance with these conditions, Xstrata will be obliged to review and update its comprehensive Water Management Plan for the mine complex[2].

Surface Water and Flooding

The EA included a surface water impact assessment undertaken by Gilbert and Associates Pty Limited.

The Narama West mining area would be incorporated into the existing water management system for the Ravensworth mine complex. Modelling indicated that the proposed modification would result in little variation to the overall project water balance and that the mine complex water management system would be highly reliable in meeting all on-site demands. Notwithstanding, as detailed above, the Department notes that the existing conditions require Xstrata to ensure it has sufficient water licences and, if necessary, adjust the scale of mining operations to match its available water entitlements.

[2] Condition 4 of schedule 5 of the project approval requires the Proponent to review, and if necessary revise, all management plans (amongst other things) for the project within 3 months of any approved modification.

The assessment identified that there would be little difference to the total catchment area of site water storages and minimal changes to the final landform resulting from the proposed modification.

As detailed above, Bayswater Creek has been diverted in the vicinity of the Narama West mining area as part of historical mining operations for the Narama mine. Xstrata has committed to maintain a minimum 40m buffer zone between the proposed mining operations and the creek diversion. The Department notes that maintenance of this buffer zone is in accordance with the *Management of Stream / Aquifer Systems in Coal Mining Developments, Hunter Region* (DIPNR, 2005) for a schedule 2 stream.

To manage impacts on the creek diversion during mining, the approved Water Management Plan for the Ravensworth Operation Project requires Xstrata to monitor and maintain water quality, ecology and hydrological and geomorphologic integrity of the creek diversion. The conditions also require Xstrata to rehabilitate and revegetate the Bayswater Creek diversion to provide a hydraulically and geomorphically stable stream following mining and rehabilitation in the applicable area, and to prepare and implement a detailed Creek Diversion Management Plan.

The Department is therefore satisfied that potential additional impacts on the Bayswater Creek diversion as a result of the Narama West mining area can be managed in accordance with the existing conditions of approval, and the proposed 40 m setback from the diversion would be sufficient to avoid any significant interactions with the proposed Narama West mining area.

With regard to flooding, the surface water assessment indicated that for a 1 in 100 year and 1 in 250 year Average Recurrence Interval (ARI) flood event, the predicted peak water level in the Bayswater Creek diversion would not overflow into the Narama West mining area.

The Department is satisfied that the modification would have minimal additional impact on surface water and can be managed through the existing monitoring network. However, the Site Water Balance and Water Management Plan would need to be updated to reflect the proposed modification, as required by the existing conditions of approval.

Biodiversity

The EA included an Ecological Impact Assessment undertaken by Cumberland Ecology.

The assessment indicates that the proposed Narama West mining area would disturb a total area of 88.7 ha of rehabilitated woodland and grassland, disturbed unvegetated land and a number of small dams. However, the majority of this disturbance (79.8 ha) would be located within the approved overburden emplacement area for the Ravensworth Operations Project (see Figure 3). Consequently, any impacts to biodiversity within this boundary have already been approved (and offset) under the 2011 project approval.

However, the modification would result in an additional disturbance of 8.9 ha outside the approved overburden emplacement area (see Figure 6). This area comprises 1.7 ha of rehabilitated woodland, 0.8 ha of rehabilitated exotic pasture grassland, 0.1 ha of small dams and 6.4 ha of disturbed, unvegetated land. No threatened flora species were recorded within the additional disturbance area, nor does this area support any Endangered or Critically Endangered Ecological Communities (EECs or CEECs) listed under the *NSW Threatened Species Conservation Act 1995* (TSC Act) or *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The small portion of rehabilitated woodland within the additional disturbance area does support habitat for 5 local threatened fauna species listed under the TSC Act and/or EPBC Act. Additionally, during a site inspection in October 2012, one Speckled Warbler, a declining woodland bird species listed as vulnerable under the TSC Act, was identified in the approved overburden emplacement area (adjacent to the additional disturbance area).

The Department notes that all threatened species considered likely or known to occur within the modification disturbance boundary are highly mobile and capable of seeking larger, better quality and more intact woodland and grassland that occurs widely in the locality. As such, the Department is satisfied that the removal of this small portion of additional rehabilitated woodland would not have a significant impact on these threatened species. Furthermore, the existing conditions of approval require Xstrata to offset the impacts of the approved overburden emplacement area and these

additional offsets, located in the vicinity of the proposed modification[3], would provide higher quality habitat for the potentially impacted fauna species.

Figure 6: *Vegetation of the Additional Disturbance Area*

[3] The approved offsets are located onsite (immediately north of Ravensworth North Pit), and offsite (between 5 to 8 km north of the project boundary).

The Department also notes that following cessation of mining operations, the additional 8.9 ha disturbance area would be backfilled and rehabilitated in accordance with the existing conditions of approval, therefore re-establishing the woodland removed to accommodate the modification in the long term. To compensate for the additional 1.7 ha of rehabilitation woodland that would be removed by the proposed modification, the Department has recommended conditions requiring an additional 5 ha of woodland to be established in the approved rehabilitation area. Given that the proposed modification would remove a relatively small area of rehabilitated woodland, and that Xstrata is already required to rehabilitate 1,762 ha of woodland (in addition to 1,958 ha of offsets), the Department is satisfied that the additional 5 ha rehabilitation requirement is more than adequate to offset clearing of 1.7 ha of rehabilitation woodland.

Subject to this condition, the Department accepts that the proposed Narama West modification would not significantly impact the biodiversity values of the area and can be appropriately managed generally in accordance with the existing conditions of approval. In accordance with these existing conditions, Xstrata is obliged to update it Biodiversity Management Plan for the project to accommodate and address the additional impacts associated with the proposed modification.

Other Issues Associated with Narama West

The Department's assessment of other issues related to the Narama West mining area is presented in Table 1 below. In summary, all other issues are considered to have negligible environmental impacts over and above those already assessed and approved for the Ravensworth Operations Project, and can be managed in accordance with the existing conditions of approval.

***Table 1**: Consideration of other issues – Narama West*

Issue	***Consideration***	***Recom-mendation***
Amenity (Noise and Air Quality)	• The EA included a semi-quantitative noise impact assessment undertaken by SLR Consulting Australia Pty Limited, and a semi-quantitative air quality and greenhouse gas impact assessment undertaken by Pacific Environment Limited. • Noise and dust emissions were calculated for the two potential mining methods (truck and shovel and dragline) during the year when the maximum quantity of material would be disturbed (2013). • The assessments found that the noise and air quality impacts of the Ravensworth Operations Project including the Narama West mining operations would be no worse than the approved project, particularly because: o other activities associated with the Ravensworth Operations Project would be proportionately reduced during mining operations at Narama West; o no additional machinery or infrastructure would be required as existing machinery from the Narama mine would be used for the proposed modification; and o the Narama West mining operations would be located approximately 2km further west of sensitive receivers than the existing Narama operations (see Figure 2), therefore potential impacts would not likely exceed those assessed and approved under the existing conditions of approval. • Xstrata proposes to utilise existing management controls, including meteorological forecasting and real time continuous noise and dust monitoring, to ensure there would be no additional exceedances of the relevant criteria. • With regard to greenhouse gases, the modification would generate an insignificant increase of less than 1% of the total greenhouse gas emissions (scope 1, 2 and 3) for the life of the Ravensworth Operations Project. • Consequently, the Department and the EPA are satisfied that the noise and air quality impacts resulting from the modification would be consistent with the impacts associated with the approved project, and can be managed in accordance with the existing conditions of approval. Under these conditions, Xstrata will be required to review, and if necessary update, the Noise Management Plan and Air Quality and Greenhouse Gas Management Plan for the project to accommodate any necessary changes as a result of the modification.	No additional conditions or amendments necessary.

Issue	Consideration	Recom-mendation
Blasting	• The EA included a blast impact assessment undertaken by SLR Consulting Australia Pty Limited. • Given that blasting would be located at a similar or further distance away from sensitive receivers, blast vibration and overpressure impacts would be comparable or less than that predicted for the approved operations. • Xstrata proposes to design blasts to meet the approved blast vibration criteria. • The Department is satisfied that blasting can continue to be effectively managed and monitored in accordance with the existing Blast and Management Plan (BMP). Under the existing conditions, this plan will be required to be reviewed, and if necessary updated, to accommodate the modification.	No additional conditions or amendments necessary.
Aboriginal Heritage	• The Aboriginal heritage and archaeological assessment undertaken for the Ravensworth Operations Project identified a number of Aboriginal archaeological sites, none of which occur within the proposed modification disturbance boundary. • The proposed modification occurs in an area that has been previously disturbed by mining activities and as such, it would be unlikely for items of Aboriginal heritage to be extant within the area. • Further, the majority of the Narama west pit occurs within the approved overburden emplacement area for the Ravensworth Operations Project, an area for which the potential impacts on Aboriginal cultural heritage have already been assessed and managed through the existing project approval. • Xstrata proposes to manage potential Aboriginal heritage impacts in accordance with its approved Aboriginal Cultural Heritage Management Plan. • The Department is satisfied that the proposed modification would not likely result in any additional impacts to Aboriginal cultural heritage. In accordance with the existing approval conditions, Xstrata will be required to review, and if necessary update, its Aboriginal Cultural Heritage Management Plan for the project to accommodate the modification.	No additional conditions or amendments necessary.
Traffic and Transport	• The proposed modification would not increase the amount of ROM coal transported by train, nor would it increase the approved workforce and service demands. • Consequently, the Department is satisfied that there would be no material change to traffic and transport associated with the Ravensworth Operations Project, and it can be effectively managed and monitored according to the existing Traffic and Transport Management Plan.	No additional conditions or amendments necessary.
Visual Amenity	• The EA for the Ravensworth Operations Project included a visual impact assessment which identified that the majority of private receivers to the south and south-east of the site, including Camberwell Village, are shielded from the operations by an existing ridgeline. • Any views of the proposed Narama West mining area (including night time lighting) would be consistent with existing approved operations. In addition, there would be no significant change to the final landform and visual character of the site post-mining, including no change to the height of the approved overburden emplacement. • Consequently, the Department is satisfied that the visual impacts of the modification are acceptable and can be managed in accordance with the existing conditions of approval.	No additional conditions or amendments necessary.
Final Landform and Rehabilitation	• Upon completion of proposed mining operations, the Narama West mine void would be progressively backfilled with overburden and utilised as an overburden dump, which is consistent with the existing project approval. The area would later be reshaped and rehabilitated in accordance with the approved Mining operations Plan and rehabilitation strategy. • The modification would produce an additional 12.4 million bank cubic metres of overburden, which would initially be disposed of within the approved overburden emplacement area for the Ravensworth Operations Project, adjacent to the Narama West mining area, and then used to progressively backfill the void (see Figure 3). • The Department notes that the proposed modification would increase the extent of the approved overburden emplacement area by 8.9 ha,	No additional conditions or amendments necessary.

Issue	Consideration	Recom-mendation
	due to the additional land disturbance associated with the western edge of the Narama West pit (see Figure 6). • A detailed dump balance was undertaken as part of current Life-of-Mine Process, which forms the basis for Xstrata's Mining Operations Plan. The dump balance analysis accounted for the waste volume produced, allowing for swell, coal volume and final landform requirements, and concluded that the modification would not impact the final height of the approved overburden emplacement. • Consequently, the Department is satisfied that the proposed modification would not alter the approved final landform and rehabilitation for the site.	
Socio-economics	• The Narama West operations would use the existing operational workforce and equipment from the Narama mining area to optimise coal resource recovery in the mine. • The modification would allow the recovery of an additional 2.7 Mt of ROM coal, provide continuing State and Commonwealth royalties and tax income, and efficiently recover resources that would otherwise be sterilised. • Given these benefits, and the limited environmental impacts predicted, the Department is satisfied that the proposed modification would have positive socio-economic outcomes.	No additional conditions or amendments necessary.

5.2 Aboriginal Grinding Groove Blast Vibration Criteria

The EA for the Ravensworth Operations Project identified an Aboriginal grinding grove site (REA86) located approximately 250m north of the Ravensworth North Pit (see Figure 3). REA86 was assessed as being highly significant in terms of culture and archaeology and, as such, Xstrata committed to limit the blast vibration criterion at REA86 to 30 millimetres per second (mm/s) to manage potential blasting impacts.

This criterion was based on a precautionary and conservative approach, and was not based on any specific geotechnical assessment. The EA for the Ravensworth Operations Project suggested that the criterion be refined over time based on the results of future geotechnical assessment, however the project approval does not include any provision to alter the blast criterion as there was no information available at that time suggesting that a higher criterion would be acceptable.

Xstrata has now undertaken a detailed geotechnical assessment, including a strain analysis undertaken by Terrock Consulting Engineers (Terrock), to determine the maximum safe (non-damaging) blast vibration criteria at the grinding groove site.

The assessment estimated that the grinding groove sandstone rock ledges would likely have a tensile failure strain of 295 microstrain, or an equivalent peak particle velocity (PPV) limit (or vibration limit) of 354 mm/s. Based on this assessment, a blast would likely need to result in a PPV of 354 mm/s to cause damage to REA86.

To allow for uncertainty, Terrock recommended a safety factor of 3, which would give a PPV limit of around 120 mm/s. However, it was also recommended that a safety factor of 2 would be justifiable if Xstrata implemented an incremental observational approach to gradually increase the PPV from 30 mm/s to 60, 120 and 175 mm/s.

Accordingly, in the proposed modification Xstrata proposes to incrementally increase the blast vibration criteria from 30 mm/s to a maximum of 175 mm/s.

In coming to the above recommendation, Terrock assessed the ground flexure of the sandstone and the potential for cumulative blasting impacts. The rock is not a continuous layer, but is articulated into discrete blocks by jointing planes and the surface of the rock ledge will flex, thereby decreasing strain and potential for damage. Given that sandstone is relatively elastic by nature, and that the majority of blasts would result in a PPV less than 175 mm/s, the assessment concluded that cumulative blasting impacts would be insignificant.

OEH initially raised concerns with the data used to support the proposed modification and in response Xstrata carried out additional studies and a literature review in consultation with OEH. Following review of this additional information, and completion of a supplementary report, OEH

confirmed that it accepts the report's findings and raised no further concerns or objections to the proposal to gradually increase the blasting vibration criteria to a maximum of 175 mm/s (see Appendix B, C and D of the RTS).

The Department also notes that Xstrata consulted with the relevant Aboriginal stakeholders prior to submitting its modification application (refer to Appendix H of the EA). All Aboriginal stakeholders were in favour of the proposed modification. As part of the ongoing consultation process, Xstrata has committed to engaging Aboriginal stakeholders when the blast vibration criteria is incrementally increased to 60, 120 and 175 mm/s. This consultation would include monitoring of the grinding grove by Aboriginal stakeholders.

The Department is satisfied that the geotechnical assessment indicates that REA86 is unlikely to be adversely affected by the proposed higher ground vibration limits. To ensure the protection of the grinding grooves site, the Department has recommended conditions requiring Xstrata to comply with each incremental ground vibration limit, up to a maximum of 175 mm/s. In applying for approval from the Director-General for an increase in the incremental limit (i.e. from 60 mm/s, to 120m mm/s, and then from 120 mm/s to 175 mm/s), Xstrata would be required to provide a report prepared by a suitably qualified expert, in consultation with OEH and relevant Aboriginal groups, demonstrating that blasting at these limits is not having any discernible impact on the axe grinding groove site.

Under the existing conditions, Xstrata would also be required to review and update the Aboriginal Cultural Heritage Management Plan for the project to accommodate the modification. The existing conditions require that this plan includes procedures for monitoring, notifying and managing the effects of blasting on Aboriginal sites. The Department has recommended an additional requirement that the plan includes specific provisions to manage the incremental ground vibration limits.

5.3 Administrative Matters

The proposed modification also includes a small number of minor administrative amendments. The Department's consideration of these amendments is presented in Table 2 below.

***Table 2**: Consideration of Administrative Amendments*

Issue	***Consideration***	***Recommendation***
Amendment to Approved Project Boundary	• Xstrata proposes to amend the approved project boundary to include the existing Newdell substation (see Figure 5), which is located on land consistent with the approved schedule of lands. • The Department notes that: o Xstrata manages and relies upon the Newdell substation for electricity to supply its current operations; o the approved operations boundary currently cuts through the middle of the Newdell substation; and o the proposed boundary amendment is purely administrative in nature. • Consequently, the Department is satisfied that the proposed boundary amendment would have no operational or environmental consequences and has updated the conditions of approval accordingly.	The Department has amended the conditions to include the realigned project boundary.
Amendment to Blast Management Plan	• Xstrata proposes to include additional requirements in its BMP to incorporate the commitments of an existing agreement with Coal & Allied, which operates the adjacent Hunter Valley Operations mine. • The proposed additions relate to measures to protect Coal & Allied infrastructure and safety of employees at HVO, and would not have any environmental consequences. • The Department is satisfied that the additional BMP requirements would not negate or conflict with the approved BMP. • Consequently, the Department has amended the conditions of approval accordingly to reflect the existing agreement between Xstrata and Coal & Allied.	The Department has amended the conditions to include the existing agreement with Coal & Allied.
Amendment to Approved Aboriginal	• Xstrata's statement of commitments for the Ravensworth Operations Project (reproduced in Appendix 3 of the project approval) currently includes Commitment 6.10.1, which	The Department has amended the statement of

Issue	Consideration	Recommendation
Archaeologist	requires an archaeological significance assessment of the Hillcrest Offset Area to be conducted by Umwelt archaeologists. • Xstrata proposes to amend this commitment to allow for *any* appropriately qualified archaeologist to conduct the assessment. • The Department is satisfied that this amendment is purely administrative and has no material consequences.	commitments to reflect this request.

6 RECOMMENDED CONDITIONS

The Department has drafted a recommended notice of modification (see **Appendix A**) for the proposed modification as well as a consolidated version of the project approval as modified (see **Appendix B**). In summary, these conditions:

- reflect the Narama West mining area and the revised project boundary;
- require Xstrata to implement additional woodland revegetation in the rehabilitation area;
- require Xstrata to comply with the incremental ground vibration limits at Aboriginal site REA86;
- reflect Xstrata's blasting agreement with Coal & Allied; and
- remove the reference to a specific archaeologist from the statement of commitments.

The Department has also taken the opportunity to update the agency names in the project approval.

Xstrata has reviewed the proposed conditions and has raised no objections.

7 CONCLUSION

The Department has assessed the merits of the proposed modification in accordance with the relevant requirements of the EP&A Act. This assessment has found that, with the implementation of suitable mitigation measures under existing and proposed management plans, the proposed modification would not result in any significant additional environmental impacts.

The proposed modification would allow Xstrata to access an existing coal resource from a previously mined area, utilising existing mine infrastructure and preventing sterilisation of this coal resource. The modification also addresses a number of administrative issues that would ensure the effective operation of the mine.

The Department is satisfied that the benefits of the proposed modification sufficiently outweigh any residual costs, and that it is therefore in the public interest and should be approved, subject to conditions.

8 RECOMMENDATION

It is recommended that the Executive Director, Development Assessment Systems and Approvals, 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 attached notice of modification (**Appendix A**).

Mike Young 16.8.13
Manager
Mining Projects

16/8/13
David Kitto
A/Executive Director
Development Assessment Systems and Approvals

APPENDIX A: NOTICE OF MODIFICATION

APPENDIX B: CONSOLIDATED PROJECT APPROVAL

APPENDIX C: ENVIRONMENTAL ASSESSMENT

APPENDIX D: SUBMISSIONS

APPENDIX E: RESPONSE TO SUBMISSIONS