Hunter Valley Operations North
Modification 6 – In-pit Fine Reject Emplacement
(DA 450-10-2003 MOD 6)

Environmental Assessment Report
Section 75W of the *Environmental Planning and Assessment Act 1979*

1. BACKGROUND

Coal and Allied Operations Pty Limited (Coal and Allied), a subsidiary of Rio Tinto, owns and operates the Hunter Valley Operations (HVO) mining complex, located approximately 24 kilometres (km) northwest of Singleton, in the Hunter Valley (see **Figure 1**).

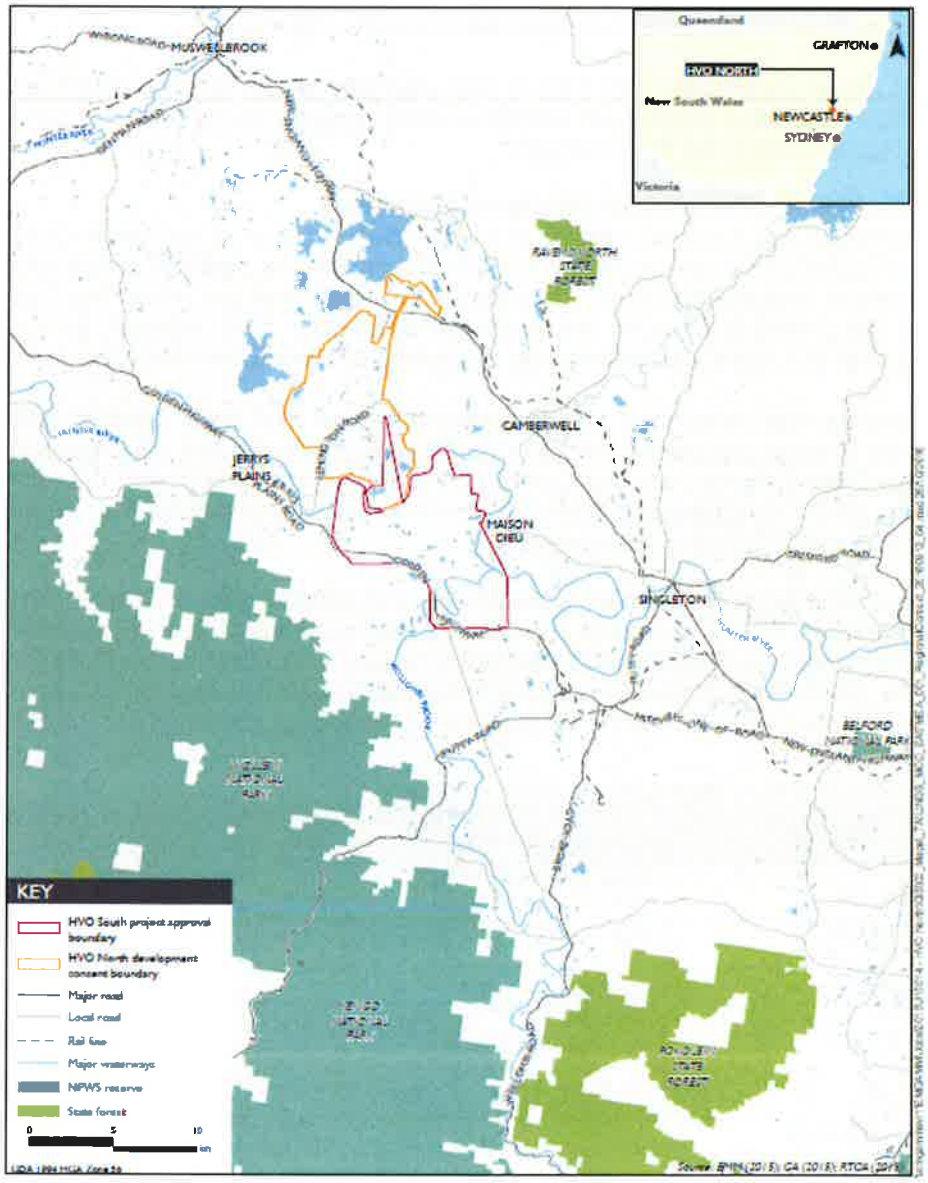

Figure 1: *Location of the HVO mining complex*

The HVO mining complex includes HVO North and HVO South (see **Figure 1**), which are geographically divided by the Hunter River and regulated by two separate approvals. HVO North includes the Carrington Pit and West Pit and operates under development consent (DA 450-10-2003) granted by the then Minister for Infrastructure and Planning in 2004 and the subject of this proposed modification.

The consent has been previously modified five times, including extensions to the Carrington Pit in southerly, easterly and westerly directions, and allows Coal and Allied to:

- extract up to 22 million tonnes of run-of-mine (ROM) coal a year, until June 2025;
- process coal on site at the Hunter Valley Coal Handling and Preparation Plant (HVCHPP) or the Howick Coal Handling and Preparation Plant (HCHPP); and
- transport coal to the Port of Newcastle for export or to local power stations for domestic use.

2. PROPOSED MODIFICATION

On 11 November 2016, Coal and Allied lodged a modification application under section 75W of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The proposed modification seeks to change the material used to backfill the Carrington Pit void (see **Figure 2**). More specifically, this modification would involve:

- emplacement of approximately 12.6 million loose cubic metres (lcm)[1] of fine reject within the Carrington Pit void rather than overburden material, using existing pipes and infrastructure; and
- emplacement of overburden material that would have otherwise been placed in the Carrington Pit into existing approved overburden emplacements, elsewhere on site.

The proposed modification does not involve any changes to the already approved disturbance boundaries, state of existing overburden emplacements, groundwater take, or the size and function (evaporative sink) of voids in the final landform.

2.1 Coal and Allied's Fine Reject Management Strategy

Fine reject is a by-product of coal processing that is pumped as a slurry from the two coal handling and preparation plants (HVCHPP and HCHPP) at the HVO complex via pipelines to the approved on-site emplacement areas. Based on current coal production rates, Coal and Allied has forecast that the approved fine reject storage capacity onsite will be reached by 2019. Additionally, Coal and Allied projects that further fine reject storage capacity is required as early as the first quarter in 2018.

The HVO complex has three fine reject storage facilities that have recently been filled and decommissioned (Centre, Southeast and Bobs Dump). A further three fine reject storage facilities are currently active (Dam 6, North Void and Cumnock Void 3), while the Carrington Out-of-Pit fine reject emplacement (COOP FRE) approved in Mod 4 has not yet been constructed. The Cumnock Void 3 is owned by Glencore and used with its agreement.

As a condition of Mod 4, the Department required Coal and Allied to develop a life of mine Fine Reject Management Strategy (FRMS) in order to provide long-term solutions for the management of fine reject across the HVO complex and also minimise land disturbance, environmental risk and operational costs, where possible. The FRMS is based on an estimated production schedule of 24.53 Mt of fine reject between 2015 and March 2030. The FRMS outlines two strategies, identified as 'current' or 'alternate' and summarised in **Table 1**.

Table 1: *HVO North Fine Reject Management Strategy options*

Option 1 (Current)	Option 2 (Alternate)	Differences between Options 1 and 2
North Void	Enlarged North Void*	North Void requires an enlargement in Option 2
Carrington Out-of-Pit	N/A	Carrington Out-of-Pit is not proposed under Option 2
Carrington In-pit*	Carrington In-pit*	No change
West Pit	West Pit	No change
Dam 6	Enlarged Dam 6*	Dam 6 requires an enlargement in Option 2
Cumnock Void	Cumnock Void	No change

Note: subject to approval*

[1] *The Department has confirmed with Coal and Allied that its use of the term "bulk cubic metres" in the EA is more accurately described as "loose cubic metres" as opposed to "bank cubic metres".*

The main difference between these two strategies is that Option 2 would involve enlargement of the North Void and Dam 6 and not constructing the approved COOP FRE. Importantly, the FRMS concludes that the current strategy would satisfy the projected FRE needs for the project, while there would be a gap in 2028 under the alternate strategy. However, Coal and Allied considers that it is not currently economically feasible to construct and operate the COOP FRE (as scheduled in Option 1) and instead propose to establish and utilise the Carrington In-pit fine reject emplacement (CIP FRE). The construction and use of the COOP FRE is proposed to be deferred.

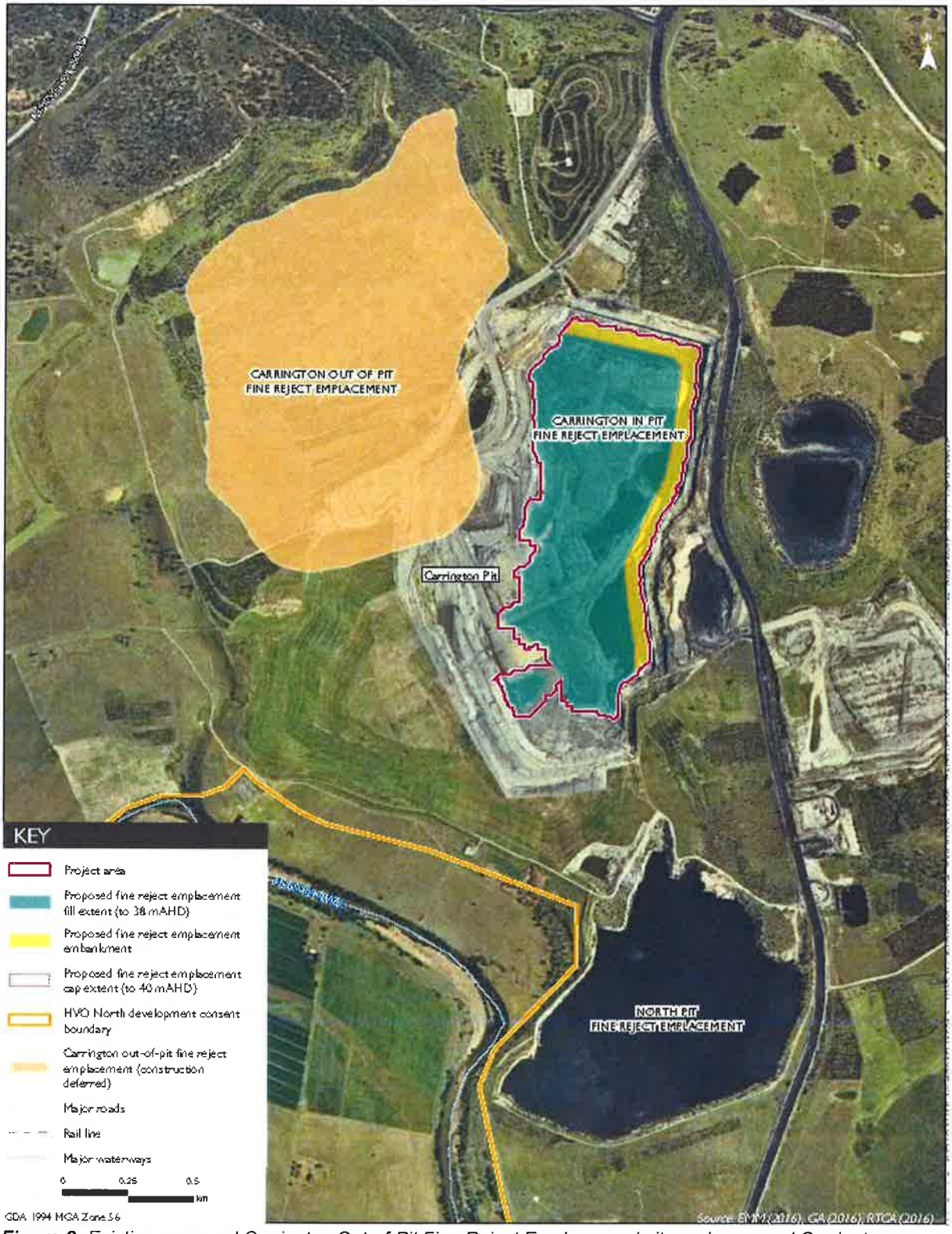

Figure 2: *Existing approved Carrington Out-of-Pit Fine Reject Emplacement site and proposed Carrington In-pit Fine Reject Emplacement site*

3. STATUTORY CONTEXT

3.1 Section 75W

DA 450-10-2003 was granted under Part 4 of the EP&A Act. In accordance with clause 8J(8) of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) and the transitional arrangements under Schedule 6A of the EP&A Act, the modification must be determined under the former section 75W of the EP&A Act. The Department is satisfied that the proposal can be characterised as a modification to the existing consent. It does not seek to change in any significant way the nature or scale of the approved mining operations.

The Department is therefore satisfied that the proposed modification is within the scope of section 75W and may be determined accordingly.

1.1. Approval Authority

The Minister for Planning is the approval authority for the application. However, the Director, Resource Assessments may determine the application under the Minister's delegation of 16 February 2015, as there were no public objections, Singleton and Muswellbrook Councils did not object to the proposal, and no political donations have been reported by Coal and Allied.

1.2. Environmental Planning Instruments

A number of environmental planning instruments apply to the modification, including:

- *Mining SEPP;*
- *SEPP (State and Regional Development) 2011;*
- *SEPP No 44 – Koala Habitat Protection*; and
- *Singleton Local Environmental Plan 2013.*

The Department has assessed the proposed modification against the relevant provisions of these instruments. Based on this assessment, the Department is satisfied that the proposed modification can be carried out in a manner that is consistent with the aims, objectives and provisions of these instruments.

4. CONSULTATION

The Department exhibited the application from 17 November 2016 until 1 December 2016 and made the application and accompanying Environmental Assessment (EA, see **Appendix A**) publicly available on its website, at its Information Centre and the offices of Singleton Shire Council and Nature Conservation Council.

The Department notes that Coal and Allied also conducted its own consultation with key stakeholders prior to finalising the application. This involved meeting with key government agencies and the HVO mining complex's Community Consultative Committee to inform and refine the project.

The Department also consulted with relevant government agencies. The Department received a total of four submissions from government agencies and one from a local Council. Copies of agency submissions are included in **Appendix B**. A summary of the issues raised in these submissions is provided below.

The **Department of Primary Industries** (DPI) requested further information relating to water licensing impacts in the proposed final landform, including any changes to water take in the Jerrys Plains Water Source. These comments are addressed in **Section 5.1.2.**

The **Division of Resources & Energy** (DRE) within the NSW Department of Industry noted that sustainable rehabilitation outcomes would be achieved and considered that the potential environmental risks have been adequately addressed.

The **Environment Protection Authority** (EPA) advised that, should the modification be approved, a variation to the mine's Environment Protection Licence (EPL) 640 should be sought. Further discussion of comments provided by the EPA can be found in **Section 5.1.3**.

The **Office of Environment and Heritage** (OEH) advised that it had no objections to the proposed modification as it does not involve any additional impacts or changes in respect to Aboriginal cultural

heritage, flooding, floodplain management or threatened biodiversity. Consequently OEH did not recommend any changes to existing conditions.

Muswellbrook Shire Council (MSC) did not provide any comment on the proposed modification as the Carrington Pit is located outside of Council's boundary. **Singleton Shire Council** did not make a submission.

In response to these submissions, Coal and Allied provided the Department with a Response to Submissions (RTS) report in two parts received on 14 December 2016 and 11 January 2017 (see **Appendix C**). All agencies were satisfied with the responses provided. Their recommended conditions have been included in the proposed Notice of Modification, or are already required under the existing development consent.

5. ASSESSMENT

The Department has assessed the merits of the proposed modification in accordance with the relevant objects and requirements of the EP&A Act. In assessing these merits, the Department has considered the:

- Environmental Impact Statement for the original development application;
- existing conditions of consent for the development as originally approved;
- modification application and associated EA; and
- relevant environmental planning instruments, policies and guidelines.

The Department considers that the key impact of the modification relates to groundwater. Other impacts are considered in **Section 5.2**.

5.1 Groundwater

The EA included a Groundwater Impact Assessment (GIA) that investigated the potential impacts from the change in material used to backfill the Carrington Pit. The key issue arising from this change in material is the effect on the function of the Carrington Pit final void to act as an evaporative sink after mining is completed. The aim of this sink is to facilitate evaporative losses at a rate that is greater than the accumulation of rainfall, groundwater and infiltration through the rehabilitated final landform. This is necessary to ensure that the saline groundwater accumulating in the final void does not overflow the groundwater barrier wall at HVO North into the Hunter River or its associated alluvium. The groundwater barrier also prevents loss from the Hunter River and associated alluvium that would otherwise occur as a result of mining.

5.1.1 Hydraulic conductivity of groundwater

This replacement of overburden with fine reject for use as back fill of the Carrington Pit may change the hydraulic gradients in the vicinity of the Carrington Pit.

Table 2 presents the horizontal hydraulic conductivities of different water bearing strata and materials for comparison including fine reject and overburden. This indicates that the hydraulic conductivity of fine reject is between two and four orders of magnitude lower than recently emplaced overburden, which is primarily attributed to the differences in the particle size and the consolidation behaviour of the materials. Specifically, fine reject has a smaller particle size, which is comparable to silt or clay (3.8 x 10^{-2} mm and 2 mm) while overburden has a range of particle sizes similar to clay, gravel and boulders (1.0 x 10^{-1} mm to 2.0 x 10^{+3} mm).

Table 2: *Hydraulic conductivities of different water bearing strata and material*

Hydraulic Parameters	
Material	***Hydraulic Conductivity***
Emplaced Overburden	0.7 m/day and 1.6 m/day
Alluvium	5.3 x 10^{-2} m/day and 3.70 x 10^{2} m/day
Fine reject	1.0 x 10^{-4} m/day and 1.0 x 10^{-2} m/day
Coal seams	5.24 x 10^{-7} m/day and 12 m/day
Interburden	1.87 x 10^{-7} m/day and 1 m/day

As a result of the smaller particle size and behaviour, the hydraulic conductivity of fine reject would be lower than emplaced overburden, which may reduce the hydraulic gradient of groundwater around the Carrington Pit. This may result in a short term increase in groundwater levels within surrounding strata

and coal measures. However, it is expected that this would not result in a permanent change as groundwater levels are predominantly determined by the regional hydrology, which is expected to continue to flow towards the final void.

The potential short term increase to groundwater head within surrounding strata and coal measures was noted by DPI which requested the inclusion of monitoring and reporting of water levels in the mine's Annual Review. Coal and Allied considers that groundwater movement towards the Carrington Pit is influenced by wider regional groundwater flows and hydraulic gradients due to the low elevation of the pit. Therefore a change in the hydraulic conductivity of the backfill material would not obstruct the regional flow of groundwater into the final void.

Coal and Allied also considers that the lower hydraulic conductivity and inward hydraulic gradient from the surrounding strata to the CIP FRE combined with dewatering of fine reject would minimise the likelihood of leakage from the fine reject emplacement into the surrounding strata. Coal and Allied proposes to manage this effect by depositing fine reject at the northern end of the pit and allowing water to drain to the southern end of the pit into a decant pond (see **Figure 3**). Water from the decant pond would be pumped into the mine's existing water management system and made available for reuse as outlined in the mine's Water Management Plan.

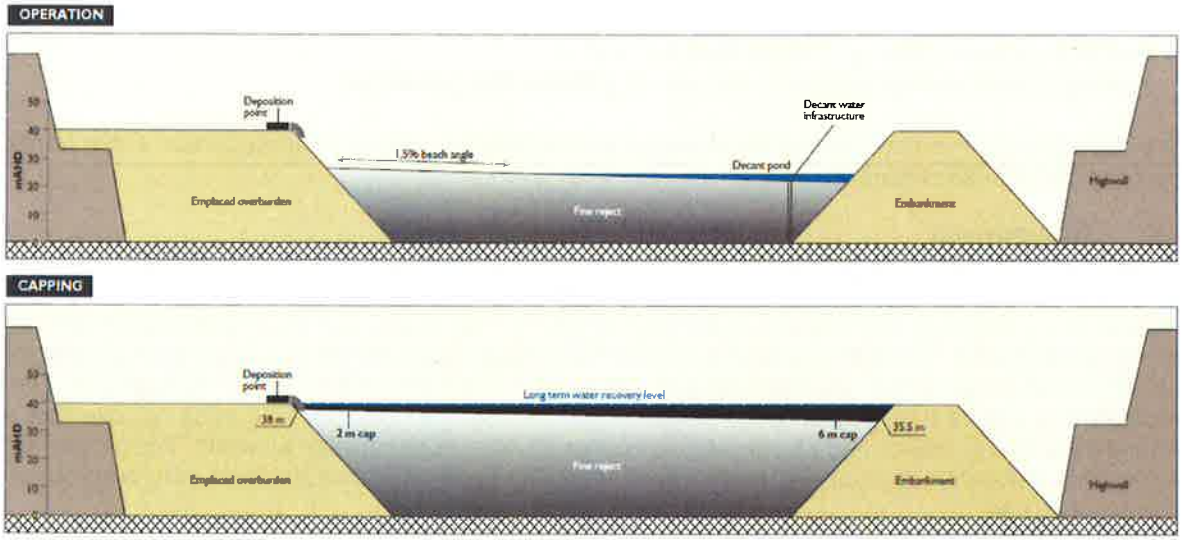

Figure 3: *Cross-section showing deposition and capping stages of the fine reject emplacement in the Carrington Pit*

DPI requested that Coal and Allied address whether there would be any impacts on water licensing or any change to the Jerrys Plains Water Source Catchment area. Coal and Allied considers that, as there would be no change to the overall design and function of the evaporative sink no changes to water licensing requirements or the Jerrys Plains Water Source Catchment are anticipated. DPI Water was satisfied with Coal and Allied's response. The Department is satisfied that the existing development consent establishes an obligation on Coal and Allied to ensure that it has sufficient licences for all water take over the life of the mine

5.1.2 Groundwater levels in the final landform

The Carrington Pit has an approved final landform which is designed as an evaporative sink (either directly from a pit lake, or by evapotranspiration from a forested area). As noted, this ensures that groundwater levels do not overflow the groundwater barrier and affect the quality of the Hunter River and its associated alluvial aquifers. Coal and Allied's modelling predicts groundwater levels in the Carrington Pit would stabilise at around 40 – 45 m AHD and below the groundwater level beyond the barrier wall (see **Figure 4**). Therefore, the proposed change in the emplacement material would not impede the function of the Carrington Pit as an evaporative sink and the groundwater barrier wall would be expected to continue to protect the Hunter River and its alluvium.

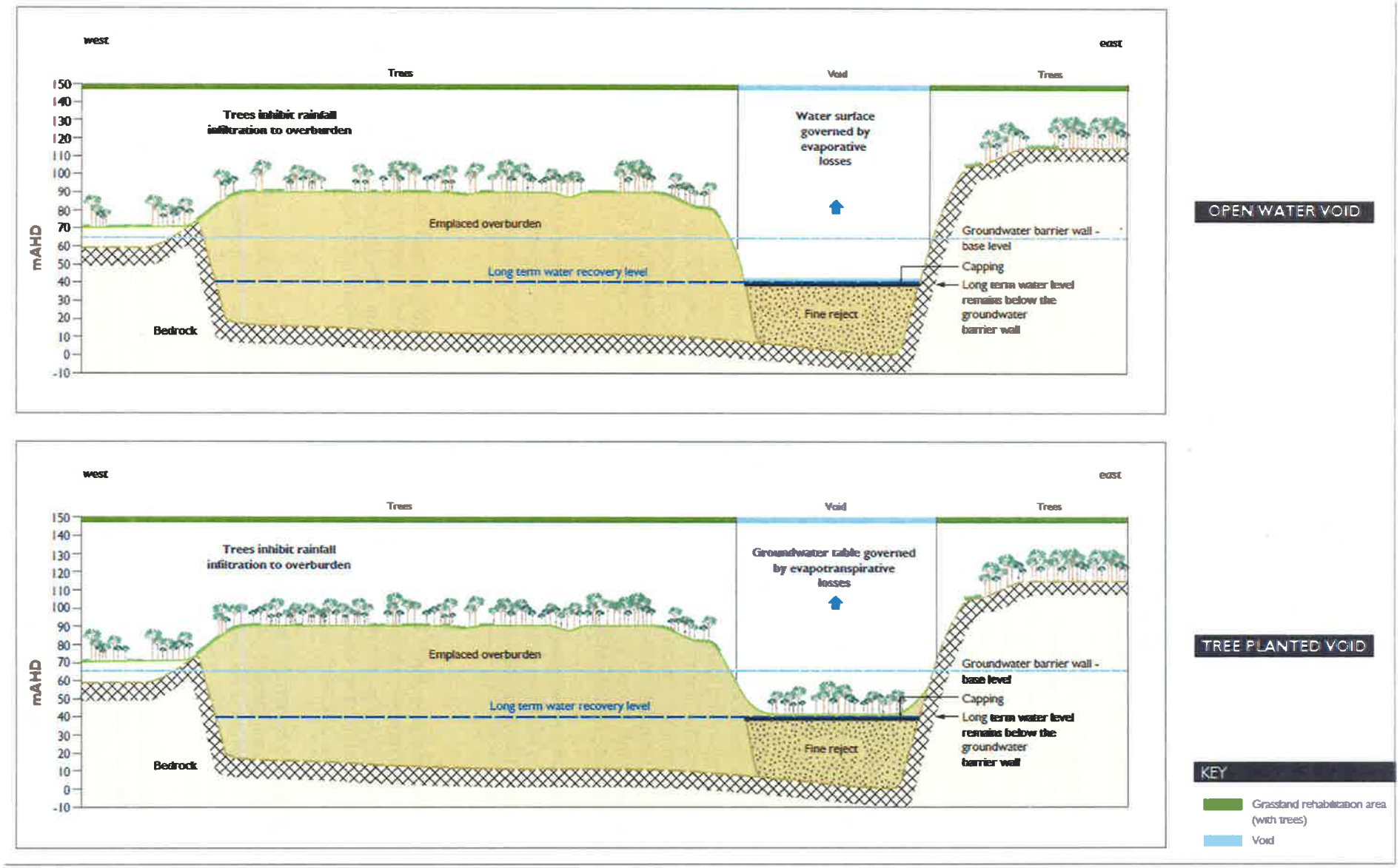

Figure 4: *Carrington Pit final void with fine reject emplacement (proposed modification)*

In order to prevent the sterilisation of unmined coal resources in the northern and eastern ends of the pit, Coal and Allied proposes to construct an overburden embankment, to separate the fine reject from the exposed Carrington Pit highwall (see **Figure 3**). Fine reject would be emplaced to a level of 38 m AHD. The embankment will also allow for infiltration of water through drainage paths at the base of the embankment to the base of the pit. This would prevent water from rising through the emplaced fine reject as it is settling and consolidating.

Once the CIP FRE is dry and stable, soil and rock capping of at least two metres at the northern end ranging to six meters at the southern end would be emplaced to create the final landform at 40 m AHD (see **Figure 3**). The capping material is likely to be sourced from surrounding overburden emplacements. Overall, the Department is satisfied that impacts to the Hunter River and associated alluvium would continue to be protected.

5.1.3 Groundwater quality

The impacts on groundwater quality as a result of backfilling the Carrington Pit were assessed in Mod 3. Coal and Allied has completed an additional assessment of groundwater quality in relation to the proposed modification which considered the previous Mod 3 water quality study and its conclusions. These studies note that the Hunter Valley coal seams have a high buffering capacity and relatively low sulphur content therefore acid rock drainage is unlikely to be of significance.

Groundwater in the area is naturally saline with electrical conductivity observed to range between 2000 – 8500 µs/cm and pH levels of 6.8 – 8.5. Coal and Allied's observations confirm that groundwater is not suitable for beneficial uses such as stock water or long-term irrigation based on ANZECC (2000) guidelines. Rather, adjacent water users predominantly use surface water from the Hunter River for agriculture, which is protected from mining-related impacts by the groundwater barrier wall and subject to extensive monitoring as required by the existing consent.

In Mod 3, Coal and Allied predicted that water collecting in the void would reflect contributions from the surrounding coal measures, overburden and rainfall runoff. Long-term water quality was predicted to exhibit pH levels ranging between 7.5 and 9.5, Total Dissolved Solids of up to 1000 mg/L, sodium concentrations greater than magnesium and calcium; and bicarbonate concentrations greater than chloride and sulphate. These parameters are generally similar to regional groundwater quality. However, water collecting in the final void is expected to be less saline than pre-mining groundwater, which has been influenced by the natural upwelling of saline groundwater from the Permian coal measures over long periods of time.

Coal and Allied also considered the impacts to water quality should fine reject be emplaced within the Carrington Pit. On average, water from fine reject had a slightly higher sulphate concentration of 1,824 mg/L compared to overburden material (1,134 mg/L). Coal and Allied does not expect this to change the classification of the water under ANZECC guidelines (ie. not suitable for irrigation, stock or domestic water use).

The EPA recommended that a Trigger Action Response Plan (TARP) should be developed to set out site specific groundwater monitoring trigger levels. Coal and Allied noted in the RTS that TARP requirements are included in a number of existing management plans. The Department is satisfied that the impact to groundwater quality would be similar to approved levels and that there are sufficient monitoring and management requirements in the existing consent.

5.1.4 Mitigation measures and management

Environmental management at the site is integrated through the HVO North and HVO South development consents, EPL 640, and relevant legislation, standards and guidelines. The Department notes that Coal and Allied would be required to seek a variation to the EPL following determination of this modification.

Coal and Allied has installed an extensive network of monitoring bores and vibrating wire piezometers (VWP) across both HVO North and HVO South. Currently, 155 bores and two VWP are monitored at HVO North under the existing Water Management Plan (WMP), required under conditions of consent (see **Figure 5**). Manual monitoring of water levels is undertaken frequently in addition to automatic data loggers recording daily readings. Regular water quality monitoring is also undertaken in accordance with the WMP. Results are reported in the mine's Annual Review.

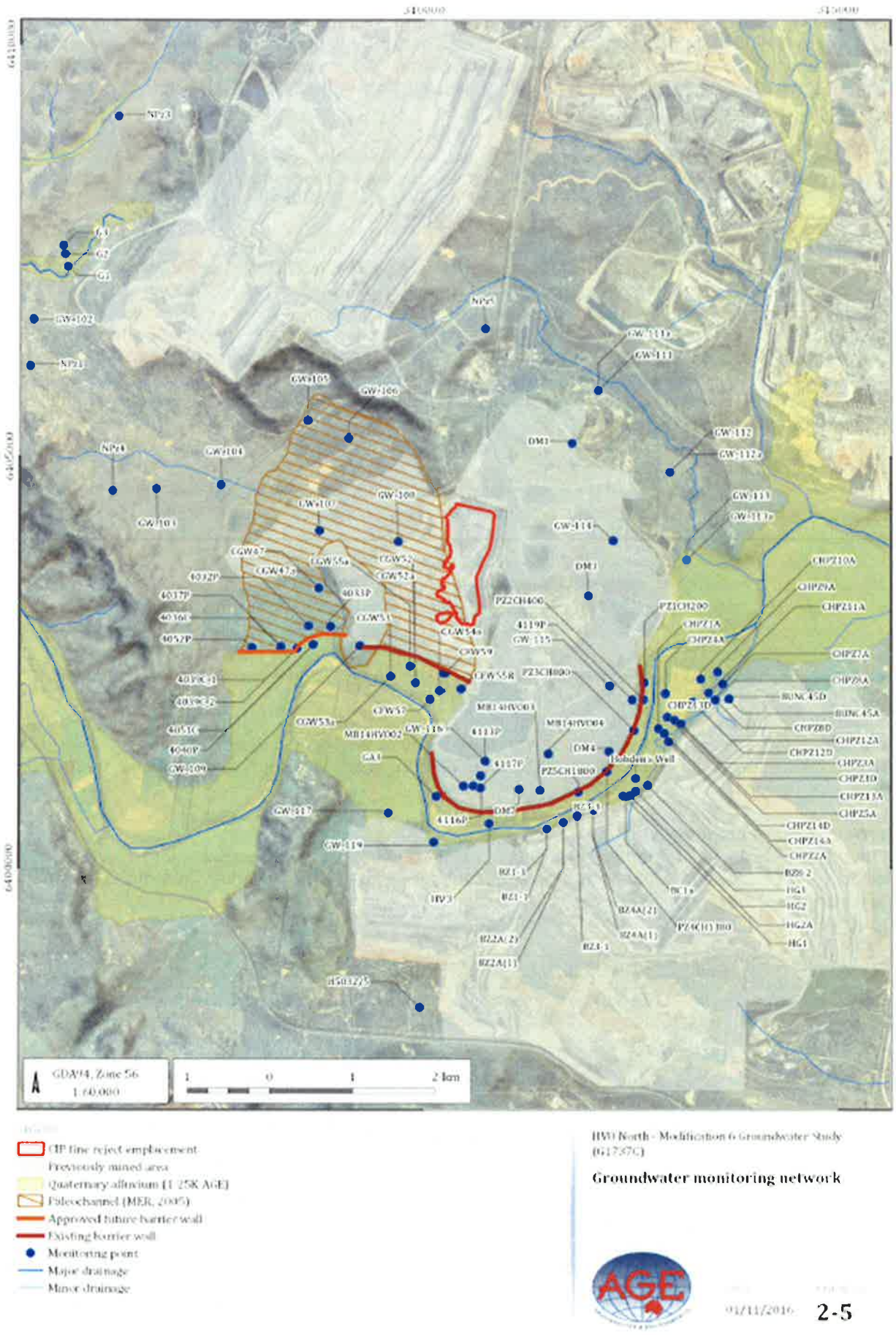

Figure 5: *Groundwater monitoring network and site of proposed in pit emplacement*

The existing WMP addresses both surface water and groundwater and requires design objectives and performance criteria for all final voids, evaporative sinks, tailings dams and groundwater barrier walls. Monitoring to show that mitigation measures are functioning in line with design criteria and contingency planning to address potential impacts is in place through the existing WMP and monitoring network (see **Figure 5**).

The Department considers that the proposed modification does not result in any significant change to currently approved activities in relation to water levels and water quality and considers the existing water and fine reject management plans do not require any material amendments, other than updates to reflect this modification.

However, in relation to the Final Void Management Plan (FVMP), the Department notes the final design has been deferred pending a decision whether or not to mine the approved Carrington West Wing extension (Mod 3). Currently, there are two approved final landform options, which would see either an open pit lake, or a vegetated void in the Carrington Pit final landform (see **Figure 4**). The Department's preference, as stated in the assessment of Mod 4, is for the final void to be planted with trees and vegetation. This would minimise the potential for seasonal fluctuations in the water level in the final void leading to the formation of a salt pan, particularly during dry conditions. The Department expects this matter to be resolved in the FVMP.

5.1.5 Conclusion

The Department is satisfied that the proposed modification is unlikely to have any significant impacts on groundwater quality, surrounding groundwater levels or the ability of the final void to act as an evaporative sink, given the:

- regional hydraulic gradients will still flow towards the Carrington Pit;
- predicted groundwater levels will be maintained at approximately 40 m AHD ;
- approved final void and CIP FRE are predicted to reach a similar final water level;
- Carrington Pit final void would continue to be separated from nearby alluvial aquifers by existing groundwater barriers; and
- impacts to groundwater water quality are not significant given the naturally saline groundwater.

The Department also notes the proposal may deliver an improved environmental outcome if the emplacement of fine rejects in the Carrington Pit together with an enlargement of other existing fine reject storage areas (as proposed in Option 2 in **Table 2**) reduces, or eliminates the need for an out-of-pit storage area.

5.2 Other impacts

Other issues associated with the modification relate to rehabilitation and final landform, surface water, biodiversity, Aboriginal cultural heritage and visual impacts. **Table 3** summarises the Department's assessment of these impacts.

***Table 3**: Other impacts*

Issue	*Impact and Consideration*	*Recommendation*
Rehabilitation and final landform	• The final void at the Carrington Pit is designed to act as an evaporative sink in the final landform. • The FVMP will set out the short and long-term groundwater management measures and must be integrated with the RMP and WMP. • The Department notes that a FVMP will be developed and implemented for the Carrington Pit once a decision whether or not to mine the Carrington West Wing has been made. • Coal and Allied notes that the overburden originally to be emplaced within the Carrington Pit will be emplaced within existing overburden emplacement areas without any change to existing design parameters, including the endorsed RMP and FVMP.	• The Department is satisfied there is no substantive change to the final landform. • Both the FVMP and FRS require consideration of the impacts on surface water and groundwater and are integrated with other management plans to ensure a consistent approach to rehabilitation planning across the mine. • An updated cross-section showing the design and final landform of the CIP FRE is included the development consent (see **Appendix 6**)

Issue	Impact and Consideration	Recommendation
Surface water	• Coal and Allied considers that the proposed modification should not result in any surface water impacts above those currently approved. • The Department notes that OEH and DPI Water did not provide any comment or recommendations in relation to surface water impacts from the proposal.	• The Department considers the existing conditions relating to surface water, which includes a surface water management plan are satisfactory.
Blasting	• Coal and Allied has an existing Blast Management Plan (BMP) to ensure blasting does not damage the Carrington West Wing groundwater barrier wall. • If Coal and Allied proceeds with mining of the Carrington West Wing there is potential for blasting to occur close to the Carrington In-pit Emplacement.	• Given mining of the Carrington West Wing is approved and would likely result in blasting close to the CIP FRE the Department recommends the BMP includes a requirement to ensure that blasting would have no impact on the geotechnical stability of the CIP FRE and associated embankment.
Biodiversity	• The proposed modification relates to the Carrington Pit void which is an existing disturbed area. • Red River Gum trees (*Eucalyptus camaldulensis*) are present south of the Carrington Pit around the Carrington Billabong. Despite active mining, water levels have remained stable as a result of the impermeable barrier walls between the Carrington Pit and the Hunter River. Coal and Allied considers that there would be no impact to the Red River Gum population as a result of this modification.	• The Department notes that the existing consent includes several conditions which require rehabilitation and regeneration of vegetation across the HVO sites including a Red River Gum Restoration Strategy. • The Department considers that the modification would not result in any impacts to biodiversity values and is satisfied that the current conditions of consent appropriately manage the existing biodiversity impacts.
Visual	• The existing consent imposes a number of conditions with respect to visual impacts, including progressive rehabilitation and visual screening of the site from Lemington Road. • Overburden which would have originally been emplaced in the Carrington Pit is able to be accommodated within already approved overburden emplacement areas, with no change to approved height or footprint limits. • Coal and Allied notes that this modification would not generate any additional impacts above those currently approved and cite a minor reduction in visual impacts to users of Lemington Road from deferring construction of the COOP FRE.	• The Department is satisfied that existing conditions addressing visual impacts would be adequate.

6. RECOMMENDED CONDITIONS

The Department has drafted a recommended Notice of Modification (see **Appendix D**) and a consolidated version of the consent as it is proposed to be modified (see **Appendix E**). The Department considers that the environmental impacts of the project can be appropriately managed through the proposed amended conditions of consent. Coal and Allied has reviewed the recommended conditions and has no objections.

7. CONCLUSION

The Department has assessed the modification application, EA and submissions in accordance with the relevant requirements of the EP&A Act. The Department has carefully considered the likely impacts of the proposal on the environment and nearby residents. The Department is satisfied that the proposed modification is of minimal environmental impact. Moreover, the Department is satisfied that these impacts can be appropriately managed by existing, modified and/or updated conditions of consent.

Existing conditions of consent require Coal and Allied to development and implement a Water Management Plan, Final Void Management Plan, Fine Reject Management Strategy and Rehabilitation Management Plan. The conditions also require that the management plans are integrated with one another and require consideration of final voids, evaporative sinks, monitoring of ground water flows and water quality. While the Department does not propose any changes to these conditions, Coal and Allied will be advised in writing of the need to update these plans to reflect the change in emplacement material, as required by condition 4 of Schedule 6.

The proposed modification would allow Coal and Allied a feasible and reasonable alternative location to emplace fine reject material, without significantly increasing the impacts and risks to the environment. The Department is therefore satisfied that the proposed modification is in the public interest and should be approved, subject to conditions.

8. RECOMMENDATION

It is recommended that the Director, Resource Assessments, as delegate of the Minister for Planning:

- **considers** the findings and recommendations of this report;
- **determines** that the modification request falls within the scope of section 75W of the EP&A Act;
- **approves** the modification application DA 450-10-2003 Mod 6, subject to conditions; and
- **signs** the attached notice of modification (**Appendix D**).

Thomas Watt
Senior Planning Officer
Resource Assessments

Howard Reed 25/1/17
Director
Resource Assessments

APPENDIX A: ENVIRONMENTAL ASSESSMENT

See: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=8070

APPENDIX B: SUBMISSIONS

See: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=8070

APPENDIX C: RESPONSE TO SUBMISSIONS REPORT

See: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=8070

APPENDIX D: NOTICE OF MODIFICATION

See: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=8070

APPENDIX E: CONSOLIDATED CONSENT

See: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=8070