Proposed Eagleton Quarry EIS - State Significant Development Submission

Technical review supporting Boral Resources (NSW) Pty Ltd's submission on the proposed development

Prepared for Boral Resources (NSW) Pty Ltd | 3 March 2017

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Final

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1 Introduction

EMM Consulting Pty Ltd (EMM) was engaged by Boral Resources (NSW) Pty Ltd (Boral) to complete a technical review of the proposed *Eagleton Quarry Environmental Impact Statement* (EIS) prepared by JBA Urban Planning Consultants Pty Ltd on behalf of Eagleton Rock Syndicate Pty Ltd (the Applicant).

The purpose of this report is to determine if the EIS:

- meets the Secretary's Environmental Assessment Requirements (SEARs), State Environmental Planning Policy's (SEPPs), NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) and Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC) and identify any deficiencies in the assessment, incorrect conclusions or incompatibility with current planning requirements;
- assessment of impacts has been undertaken in accordance with the required policies and guidelines and the findings are accurate;
- cumulative impacts have been adequately assessed; and
- determine whether the proposed management measures are adequate, practical and likely to be implemented.

1.1 Proposed Eagleton Quarry

The EIS supports a State Significant Development (SDD) application for the operation of the proposed Eagleton Quarry (the Quarry) for the:

- extraction of a hard rock reserve that is a mixture of various igneous and sedimentary rock formations for a period of up to 30 years;
- processing of that material to produce up to 600,000 tonnes per annum (tpa) of a range of products, including, aggregates and crushed rock used in road base and construction materials;
- transportation of that material from the Quarry to the Applicant's customers; and
- ancillary activities, including construction and use of a site access road, product processing and stockpile areas, offices, workshops, weighbridge and water storage dams.

The SSD application and EIS are current on exhibition by the Department of Planning and Environment (DP&E) until 6 March 2017.

1.2 Secretary's Environmental Assessment Requirements

The SEARs identify the assessment requirements that the EIS must address and were issued on 6 November 2015.

For the purpose of this technical review, the following SEARs requirements have been investigated:

- proposal description;
- planning;

- transport;
- cultural heritage;
- air quality;
- noise and blasting;
- groundwater;
- surface water;
- ecology;
- economics;
- consultation;
- rehabilitation and closure; and
- justification of the proposal.

2 Technical review

The following sections provide a technical review of the EIS to determine if it has addressed the SEARs.

2.1 Proposal description

A review of the proposal description was completed by EMM to determine if the EIS is generally consistent throughout.

EIS inconsistencies

The EIS presents a number of inconsistencies comprising project boundary, vegetation clearance, consultation with Boral, waste management and proposed mitigation measures.

Specifically, it is unclear from the EIS what is the proposed:

- Project boundary - the surrounding properties Map Sheet 2 (Appendix C) depicts a different cadastral boundary and Quarry extent (ie indicates quarry boundary extending further to the west) than the 'ultimate extent of the quarry batters' illustrated on the EIS figures and Eagleton Quarry Years 1 to 5 (Appendix D).

- Vegetation clearance – the Executive Summary, Section 7.2.2 (Impact assessment) and the Biodiversity Assessment Report (Appendix H) propose that the development will remove approximately 28.4 hectares (ha) of vegetation. In contrast, Section 4.13 (Closure and rehabilitation) suggests the final pit/void will be approximately 28.6 ha in area, while the Executive Summary and Section 4.2 (Construction activities) outline the quarry operation will require approximately 30 ha of vegetation to be cleared to produce the quarry footprint, including processing, sales and administrative areas.

  Sections 7.13 (Bushfire) and 8.0 (Mitigation measures – bush fire hazard) also identify the need for alternative emergency access route for the northern boundary onto Barleigh Ranch Way that would require clearance of vegetation that has not be considered or assessed. It is unclear what the total vegetation clearance requirements are for the proposed development.

  An accurate description of the amount and type of vegetation to be cleared is important given the sensitivity and quality of vegetation to be cleared and its resultant impact on fauna and potential offset liabilities.

- Consultation – despite Boral's Seaham Quarry (to the north) being located immediately adjacent the proposed Quarry, they were not consulted or engaged as a key surrounding landholder on the proposed development as required by the SEARs. Section 6.3 (Consultation with the local community) however indicates that Boral was consulted on the proposed development, while Section 7.3.4 (Potential traffic impact) includes a statement that the proponent 'understands' that Boral's Seaham Quarry is likely to crease operations by 2026 with relevant traffic analysis undertaken on this assumption. Both of these statements are inaccurate.

- Waste - despite the sensitive vegetation community to be impacted by the proposed Quarry (ie Spotted Gum – Broad-leaved Mahogany-Red Ironbark shrubby open forest) the Executive Summary refers to this organic material as waste associated with clearing and proposes where possible to transfer to the adjacent landscape supplies for input into its normal operations.

- Section 7.14.2 (Wastes generated) of the EIS however outlines that this material will be mulched onsite and reused in the landscaping areas and as sediment controls around the dams. No further reference is made to landscaping in the EIS or supporting technical assessments.

- Mitigation measures – Section 4.6.1 (Drilling and blasting) proposes that blasting will take place during regular operating hours and only occur during favourable weather conditions to minimise impacts, while Section 8 (Mitigation measures – operational environmental management) propose drill and blast will take place between 7 am-6 pm Monday to Friday and Saturday 7 am-12 pm. In contrast, Australian and New Zealand Environment Conservation Council (ANZECC) guidelines state that blasting should generally be limited to 9 am to 5 pm and avoid when a temperature inversion is known to exist.

The below sections identify further inconsistencies within the EIS, impact assessments and proposed mitigation measures that cast doubt on its adequacy to address the SEARs.

2.2 Planning assessment

A review of the planning assessment chapter contained within the EIS was completed by EMM to determine if it satisfies:

- the SEARs and *Port Stephens Local Environmental Plan 2013* (LEP) requirements.

Adequacy of the assessment

State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007

Section 5.4.2 (*SEPP Mining, Petroleum Production and Extractive Industries*) of the EIS outlines that the nearest residential dwellings are located approximately 1 km to the southwest however Section 2.4 (Surrounding Development) identifies the future residential area of Kings Hill (to the south-east) which appears to be located within 1 km of the proposed development. Kings Hill is bounded by Six Mile Road and within 500 m of the Pacific Highway and is zoned General Residential (R1). It is noted that the EIS only considers this area from a potential visual impact perspective. Other potential amenity impacts are ignored (eg noise and air quality impacts).

Port Stephens Local Environment Plan 2013

Section 5.4.5 (Port Stephens LEP) acknowledges the relevance of Clause 7.8 given the quarry's location within the drinking water catchment for Grahamstown Dam however no assessment or cross referencing to other relevant sections or supporting assessments is provided. The EIS should include an assessment against this relevant LEP to demonstrate project justification and compliance.

SEARs

The SEARs prescribe relevant environmental planning instruments (or EPIs) the EIS is to consider the compatibility of the proposed Quarry against. However Section 5.4 (Statutory planning instruments) does not include *SEPP (Infrastructure) 2007*. The EIS should include an assessment against this relevant SEPP.

Summary

The EIS should include an assessment of the potential impacts:

- to the development of Kings Hill residential area;

- the drinking water catchment for Grahamstown Dam; and
- SEPP (Infrastructure) 2007.

2.3 Transport

A technical review of the *traffic impact assessment* (TIS) prepared by GHD was completed by EMM to assess:

- compliance with the formal SEARS and NSW Roads and Maritime Services (RMS) requirements;
- compliance with the 2002 Roads and Traffic Authority's (now RMS) *Guidelines for Traffic Impact Assessment*; and
- the accuracy or otherwise of the assumptions and conclusions.

In general, there are a number of issues where the TIA has failed to adequately assess traffic impacts of the proposed development.

Adequacy of the assessment method

Section 7.3.4 (Potential traffic impact) of the EIS states that the proponent 'understands' that Boral's Seaham Quarry is likely to crease operations by 2026 with relevant traffic analysis undertaken on this assumption.

This statement is inaccurate and calls into question the adequacy of the TIA and supporting SIDRA analysis results, whereby this fundamental assumption is used to justify future traffic analysis (which is otherwise showing Level of Service F) with significant additional traffic safety concerns for the Pacific Highway/Italia Road intersection operations in 2026. As stated above, no consultation has been undertaken with Boral.

The following RMS requirements in the SEARs have not been included in the TIA:

- Reflect the significant traffic capacity and safety concerns associated with proposed heavy vehicle movement and traffic access (which will include significant additional daily truck traffic movements making right turns across a high speed section of the Pacific Highway from the proposed development).
- Traffic counts over three days for all the proposed traffic routes and intersections, but the TIA traffic counts for the main Pacific Highway access intersection (at Italia Road) has only been undertaken for a single day (ie Wednesday 23 November 2016). Additional traffic counts should be completed to satisfy RMS SEARs requirements.
- Road network infrastructure upgrades that are required to maintain the existing levels of service on both the local and classified road network should be identified with concept drawings. Although the TIA has identified significant and consistent reductions in the existing and future intersection levels of Service at the Pacific Highway/Italia Road intersection, no infrastructure upgrades have been identified or included in either the EIS or TIA.

Compliance with guidelines for traffic impact assessment

The TIA has not considered the future safe access requirements for public transport users, pedestrians or cyclists, in accordance with the RTA (now RMS) *Guide to Traffic Generating Developments*.

The general accuracy or otherwise of the assumptions and conclusions

The main finding of the TIA summary that *'the Eagleton quarry would not have any adverse impact on the road network in terms of intersection or route capacity'* is not consistent with the SIDRA intersection analysis results or other road safety analysis in the report.

The TIA and supporting SIDRA intersection analysis and road safety audit identified:

- The primary traffic issue in terms of the safety and capacity for the proposed developments future traffic movements is the limited future capacity of the Pacific Highway/Italia Road intersection design. Section 4.2.2 of the TIA states that *'the actual sight distance is marginal in a number of circumstances'* at this location.

  Intersection visibility is compromised by the crest in the Highway alignment (to the south) and the sight distance to the intersection for the northbound Highway traffic which is barely adequate to meet the minimum intersection traffic safety standard currently.

  The required intersection upgrade to address this deficiency is not adequately assessed or mitigated in the TIA given the need for all southbound traffic from Italia Road (including the proposed development traffic) to make a safe right turn at grade crossing movement across the high speed northbound traffic lanes of the Pacific Highway.

- Under all the current year (2016) and future year (2026) intersection traffic scenarios for which the SIDRA intersection analysis has been undertaken, for both the AM and PM peak hour intersection traffic periods, there is a reduction in the intersection level of service under every scenario modelled. For example:

  - in the year 2016 traffic analysis summary in Table 4.1 of the TIA, the intersection level of service is reduced by the development traffic from B to C in the morning peak hour and from C to D in the afternoon peak hour; and

  - in the year 2026 traffic analysis the intersection level of service is reduced by the development traffic from C to D in the morning peak hour and from E to F in the afternoon peak hour.

  These are significant and consistent changes in the intersection level of service which would represent a significant adverse traffic impact from the development for existing road traffic using the intersection.

- The intersection effectively has only a limited future life before the prevailing background traffic growth in the Pacific Highway through traffic will make the future traffic delays (and traffic safety conditions) unacceptable for local traffic using the intersection. This limited future life (which is a considered to be a maximum of ten years) will be significantly reduced (eg to five years approximately) by the proposed additional development traffic using the intersection.

  This impact is further highlighted by one of the main recommendations of the road safety audit which proposed the intersection traffic control for the minor road approach (Italia Road) should be changed from a Give Way sign to a Stop Sign. This change, although probably beneficial and necessary for traffic safety reasons, would have a further adverse affect on the intersection traffic capacity with increased traffic delays (and a reduced intersection level of service probably) for the minor road traffic at the intersection.

If this type of change is proposed to be incorporated as part of the traffic management controls, it should have been incorporated into the project SIDRA intersection analysis, but this has not been done as the SIDRA intersection analysis only examined the Give Way intersection operations.

Summary

To allow the proposed Quarry to be properly assessed the TIA requires:

- updating of the SIDRA analysis and traffic impacts to reflect Boral's Seaham Quarry continuing operations beyond 2026;
- confirmation that the safety and capacity of the Pacific Highway/Italia Road intersection to accommodate the proposed developments future traffic movements is adequate and propose intersection upgrade to mitigate impacts, if required;
- complete additional traffic counts to satisfy RMS SEARs requirements; and
- consideration of the future safe access requirements for public transport users, pedestrians or cyclists in accordance with the *Guide to Traffic Generating Developments.*

2.4 Cultural heritage

A technical review of the *Balickera Hard Rock Quarry Indigenous Archaeological Due Diligence Assessment* (IADDA) and the Aboriginal and historical section in EIS was completed by EMM to assess the:

- adequacy of the assessment method;
- continuous consultation with Aboriginal people; and
- proposed management measures.

Adequacy of the assessment method

The SEARs for heritage requires an assessment of the likely Aboriginal and historic heritage (cultural and archaeological) impacts of the proposed Quarry, having regard to the requirements of the Office of Environment and Heritage (OEH).

While the IADDA assesses Aboriginal heritage values for the proposed Quarry, it is a due diligence assessment, not a technical report. More importantly the Aboriginal due diligence assessment was prepared in 2012 and therefore cannot respond adequately to the SEARs which were published on 6 November 2015.

The IADDA is lacking in key elements described by OEH in Attachment 2 of the SEARs. The main elements that are inadequate to complete the Aboriginal cultural heritage assessment include:

- The heritage survey effort is not recorded as specified in the Department of Environment, Climate Change & Water (DECCW) *2010 Code of Practice* (ie methodology, field team, transects (tracks), historical values and impact assessment).

- Whilst it is noted that the report was originally prepared as an IADDA and therefore a clear indication of where the field team walked was not required. For the purpose of the EIS, an Aboriginal cultural heritage assessment as described in the guiding document Aboriginal cultural heritage standards & guidelines kit (National Parks and Wildlife Service 1997) was required to be prepared.

- The project boundary in the IADDA does not appear to have been modified to reflect the EIS project boundary, whereby more recent aerial photography shows an area that appears to be flooded and is adjacent to a stockpile; these features were not accounted for in the IADDA and are not visible in the 2012 mapping.

  A further comparison of the project plans indicates differences between the IADDA (Figure 1.4) and the EIS (Figures 7, 8 and 9). A clear understanding of impacts cannot be ascertained where the details of the project design differ.

- The areas of potential Aboriginal heritage on the site are based only on the 2nd order and 3rd order streams, being an unnamed water course and Seven Mile Creek respectively.

  Despite the EIS justification that bimodal distribution has been previously applied to the Hunter Valley, this model claims that within 50 m of water site frequency is highest in the Hunter Valley dropping to low numbers between 50 – 100 m and increasing in frequency again beyond 100 m from reliable water.

  The prevalence of potential sites on crests and ridges beyond a distance of 50 m from the 2nd and 3rd order streams have not been identified with archaeological potential.

- Targeted archaeological test excavation was not undertaken, therefore an understanding of project impacts on Aboriginal cultural values has not been gained and its absence was not explained in the EIS. Further, there is an inconsistency in the allocated potential of the 2nd order creeks in the study area whereby at least one 2nd order creek has not been identified with the same potential as the other 2nd order creek. Potential impacts on Aboriginal cultural heritage values are therefore not identified in the report.

- The IADDA states that European settlers extensively cleared the original native vegetation in the 1800s which indicates that European activity occurred on and around the site. It is acknowledged that 'proof' of non-existence is not possible however the EIS does not demonstrate that evidence of historical activities was sought during field survey. Further, it is unclear if early maps and plans were viewed to assist with identifying unlisted historical sites.

Continuous consultation with Aboriginal people

Given the length of time since the IADDA was prepared (ie 2012), it is unclear as to whether the registered Aboriginal parties have been continually consulted on the proposed Quarry.

Section 80C of the NSW *National Parks and Wildlife Regulation 2009* and OEH guidelines prescribe the need for continuous consultation with Aboriginal people if it cannot be demonstrated that:

- it is clear that the consultation process was initiated for the entire investigation and assessment process; and

- there has been a continuous consultation process with Aboriginal people from the investigation stage through to preparing the Aboriginal Cultural Heritage Assessment report.

OEH advice indicates that as a general rule gaps in the consultation process of 6 months or more will not constitute a continuous consultation process. Where envisaged gaps of more than 6 months occur it is recommended registered Aboriginal parties are regularly informed of project progress.

Proposed mitigation measures

The EIS mitigation measures recommend archaeological test excavations be carried out prior to construction of the internal site road across Seven Mile Creek. The requirement for test excavation however, is to inform the significance of the Aboriginal archaeological landscape during the design process and to test the predictive archaeological model.

For example, in circumstances where the archaeological landscape has been adequately characterised by other investigations, archaeological test excavation may be avoided but this decision requires justification. In contrast, the IADDA acknowledges that the archaeological model applied to the subject site has to be regional (ie regional information available) because no other investigations within a 10 km radius of the site were found.

The IADDA and EIS also do not propose mitigation measures for relics, provide protocols for contractor inductions (eg identifying relics of historical archaeological sites or State or local significance) or procedures for any unexpected finds during construction or operation.

Summary

To allow the proposed Quarry to be properly assessed the EIS requires:

- preparation of an Aboriginal cultural heritage assessment (ACHA) using the guidelines identified by OEH in '03. Appendix A2_ SEARs Attachment'. This would mean undertaking re-survey of the site in accordance with DECCW 2010 and archaeological test excavation to assist the Minister (or delegate) in the decision to approve the project;

- at the completion of the ACHA and informed by the outcomes, prepare an Aboriginal cultural heritage archaeological management plan (if required). This report should also include an unexpected finds protocol that addresses artefacts, intangible cultural sites, human skeletal material (whether Aboriginal burial or otherwise); and

- preparation of an unexpected finds protocol and contractor induction for identifying relics that is historical archaeological sites or State or local significance.

2.5 Air quality

A technical review of the *Air Quality and Greenhouse Gas Impact Assessment* (AQIA) prepared by Pacific Environment Limited (PEL) was completed by EMM to assess:

- the adequacy of the assessment methods;

- any uncertainties regarding the predicted impacts, particularly cumulative impacts; and

- the adequacy and practicality of the proposed management measures.

Whilst the AQIA has been conducted in general accordance with the SEARs and *NSW Approved Method for Modelling*, the below matters identify uncertainties in predicted impacts and proposed management measures.

Uncertainties regarding predicted impacts

The PEL AQIA provides no analysis of the AERMET-generated meteorological parameters, specifically atmospheric stability or mixing height, to enable an assessment of the quality of the meteorological model inputs.

In addition, the estimated emissions from the processing area, including conveyors, crushers, screens and transfers to stockpiles and handling by front end loader, have been quantified in Appendix B of the AQIA using "controlled" emission factors (ie wet suppression technologies) listed in the *US-EPA AP-42 Compilation of Air Pollution Emissions Factors*. In contrast, the AQIA section 7.1.1 of the EIS simply refers to the application of water at the crusher and on conveyor transfer points and makes no mention of the use of wet suppression techniques at the processing plant. On this basis, there is inconsistency between the mitigation measures proposed and the emissions calculated and modelled.

If wet suppression technologies are not proposed to be implemented at the processing plant, the use of the controlled emission factors to estimate emissions would not be appropriate and the related emissions and predicted impacts will be underestimated. If this is the case, the emissions need to be recalculated and the modelling revised to allow impacts to the surrounding environment to be determined.

Similarly, no quantification of onsite diesel fuel combustion has been undertaken as part of the assessment, instead it has been limited to the greenhouse gas assessment of the AQIA. Emissions should be recalculated to account for diesel combustion particulate matter emissions on site and modelling revised if the additional emissions are shown to be significant.

Proposed management measures

The AQIA modelling and the implementation of control measures at the processing plant should be clarified to confirm whether wet suppression technologies and emissions and dispersion modelling results reprocessed to confirm predicted impacts. As described below, the water balance allows for dust suppression demand of 0.03 kilolitres per tonnes (kL/tonne) of production in the processing plant.

All mitigation measures described in the AQIA should also be documented in an air quality management plan.

Summary

To allow the proposed development to be properly assessed the AQIA requires:

- clarification of the use of controlled emission factors for the proposed processing plant components given no wet suppression techniques are listed in the control measures;
- the implementation of control measures at the processing plant should be clarified (ie wet sprays v water application);
- if no wet suppression measures are proposed, the emissions should be recalculated and dispersion modelling revised to determine the impacts to the surrounding environment;
- quantification of diesel combustion particulate matter emissions from the proposed Quarry;
- if diesel combustion emissions are shown to be significant, dispersion modelling should be revised to adequately assess the impacts to the surrounding environment; and

- assuming that the updated AQIA indicates that air quality criteria can be met, all mitigation measures should be included in an air quality management plan.

2.6 Noise and blasting

A technical review of the *Noise and Vibration Impact Assessment* (NVIA) prepared by Global Acoustics Pty Ltd was completed by EMM to assess:

- the adequacy of the assessment methods;
- any uncertainties regarding the predicted impacts, particularly because the cumulative assessment fails to consider noise generated by Boral's Seaham Quarry; and
- the adequacy/practicality of the proposed management measures.

In general there are a number of noise and vibration impacts that the NVIA has failed to adequately assessed as detailed below.

Adequacy of the assessment method

There are anomalies evident in the measured background noise levels in the NVIA that require explanation, whereby it is considered unusual that the measured night-time rating background level (RBL) is lower at the monitoring location nearer to the Pacific Highway.

The ambient and background noise levels were monitored at two locations; Italia Road, Balickera (NM1) and 266 Six Mile Road, Balickera (NM2). The noise logger at NM1 was located in much closer proximity to the Pacific Highway than NM2. It is unusual that the measured RBL at NM1 during the night-time period is lower than that measured at NM2 given this relative proximity to the highway. The noise data graphs provided in Appendix D of the NVIA show that $L_{A90(15\text{-minute})}$ noise levels recorded at NM2 are at or below 30 dB for most of the night-time period on 17 and 18 July 2012. Further, based on the data presented, there is less than seven days of valid noise data as required by the *Industrial Noise Policy* (INP) (EPA, 2000).

Uncertainties regarding predicted impacts

The following matters required by the SEARs have not been addressed in the NVIA:

- the blast assessment methodology used to predict likely impacts is very brief, it is not clear what assumptions have been made with regard to prediction of overpressure and the assessment does consider impacts on animals or significant natural features in accordance with relevant ANZECC guidelines;
- the assessment does not specifically consider the Kings Hill residential release area;
- vibration from all activities (including construction and operation) have not been assessed in accordance with the *Assessing Vibration: a technical guideline* (DEC, 2006);
- the cumulative assessment utilises a methodology provided in the *Draft Industrial Noise Guideline (draft ING)* which is not yet an approved methodology. The cumulative noise assessment should be undertaken in accordance with current methodology provided in the INP; and
- the assessment of cumulative noise has not included noise emissions from Boral's Seaham Quarry.

Proposed management measures

The effective implementation of the proposed operational noise control monitoring and management measures will be critical in achieving off-site noise goals given that the predicted noise levels, inclusive of these measures, are equal to the project specific noise criteria at some locations. The NVIA and EIS do not however provide details of noise monitoring that will be conducted to assess the impacts of the proposed Quarry.

Summary

To allow the proposed Quarry to be properly assessed the NVIA requires:

- existing background and ambient noise levels to be determined in accordance with INP methodology;
- confirmation on the blast assessment assumptions for overpressure and an assessment of potential impacts on animals or significant natural features in accordance with ANZECC guidelines;
- assessment of potential impacts (or otherwise) to the Kings Hill residential area;
- vibration from all activities (including construction and operation) to be assessed in accordance with the *Assessing Vibration: a technical guideline*; and
- the cumulative noise assessment should be undertaken in accordance with current methodology provided in the INP and include cumulative noise emissions from Boral's adjacent Seaham Quarry.

2.7 Groundwater

A technical review of the *Water Assessment* (WA) prepared by Umwelt and supporting *Hydrogeological Investigation* prepared by URS was completed by EMM to assess:

- the adequacy of the assessment methods;
- any uncertainties regarding the predicted impacts; and
- the adequacy and practicality of the proposed management measures.

Whilst the WA methodology is appropriate, the confidence of the assessment is compromised by very limited baseline groundwater data. This is a significant limitation that greatly compromises the assessment of impacts.

Adequacy of the assessment methods

The assessment of groundwater inflows, impacts to local groundwater resources and baseflow to surface water relies on the findings of the water balance and numerical groundwater modelling for the site. Numerical modelling is a predictive tool which is only as a reliable as the input data and the accuracy of the conceptual hydrogeological model on which the structure of the numerical model is based.

Although the assessment methodology and the conclusions drawn from the modelling are considered reasonable based on the limitations and assumptions detailed in the WA, the confidence of the assessment is compromised by very limited site specific data and it is questionable whether it is sufficient to adequately address the SEARs.

Uncertainties regarding the predicted impacts

It is considered that the WA should be amended to incorporate the following additional site specific data:

- Department of Primary Industries – Office of Water (DPI-Water) requirement that sufficient baseline monitoring of groundwater quantity and quality for all aquifers is undertaken to establish a baseline incorporating typical temporal and spatial variations. Currently only one groundwater level monitoring event is recorded (with levels from five onsite monitoring bores taken once a day over two days in 2013).

  The WA states that data from only four of these five bores can be considered reliable and the therefore the groundwater model is calibrated against only one groundwater level from each bore. This is considered inadequate. An increased baseline groundwater level dataset would increase confidence in the model and associated predictions.

- There is no baseline record of seasonal groundwater level fluctuations at the site, with the exception of the one monitoring event in 2013. A greater understanding of groundwater level fluctuations would assist in the quantification of groundwater inflow to the proposed Quarry and provide appropriate assessment of the baseflow component to Seven Mile Creek.

  Although it's understood that Seven Mile Creek is ephemeral with no flow for periods of the year and that the calculated component of the catchment to the total flow to Grahamstown Dam is minimal, with no empirical creek level/flow data and comparison against seasonal groundwater levels the assessment of impact to baseflow is currently inadequate.

- The water balance model should provide a schematic depicting the model flow processes and parameters, while discussion of the water balance should clearly define the groundwater components of the water balance equation in terms of:

  - Inflows = outflows + change in storage

- The defined hydraulic properties of the local groundwater system are considered a significant limitation of the groundwater model. Parameters used are derived from falling head tests (ie one test on each monitoring bore conducted in 2013). There is no evidence that repeat (or rising head tests) tests were performed to verify data and no record or discussion in the WA detailing the analytical solutions performed on the test data to calculate hydraulic properties.

  There is also very limited analysis and assessment of how the calculated hydraulic conductivities compare to published estimates for the local aquifers. Additional hydraulic testing (eg field and potential lab testing of the core retrieved from the monitoring bore drilling program) would increase confidence in the input parameters.

- The conceptual understanding of the groundwater system would be greatly enhanced by the inclusion of a groundwater contour map showing the baseline local and regional groundwater flow regime. It is difficult to assess impacts without a clear understanding of groundwater flow direction. A pictorial representation (eg 3D block diagram) of the conceptual model would further enhance the clarity of the conceptual understanding, especially in relation to the modelled domain, structure and stratigraphy of the local geology/hydrogeology, groundwater occurrence and flow patterns (including impact pathways with respect to baseflow).

Proposed management measures

A Water Monitoring Program (WMP) should be developed for the project to include baseline monitoring (ie pre-development):

- The baseline data collected to date should be supplemented with regular surface water and groundwater monitoring upstream and downstream of the project and in the hydrogeological formations intercepted by the project. Whilst the monitoring network (bores and surface water monitoring locations) is considered adequate, the frequency of sampling should be such to capture temporal (seasonal) and spatial variations and inform the development of site specific trigger values (SSTV) for water quality. It is recommended that pressure transducer dataloggers are installed in each groundwater monitoring bore to record at least daily fluctuations in groundwater level.

- In accordance with the ANZECC (2000) guidelines, SSTV for surface and groundwater quality should be developed based on 24 months of continuous pre-construction (baseline) data if practicable. ANZECC (2000) provide guidelines for developing SSTV's if 24 months of baseline data is not available. Detail of the methodology for determining SSTV should be included in the WMP. The SSTV should be used to identify potential impacts on receiving waters (Seven Mile Creek) and to inform management responses during operation of the proposed Quarry.

It is noted that the required groundwater licence volume to account for inflows to the pit, based on the predicted water take, is not secured for the proposed development and will need to be secured by water allocation or the trading market (ie from other mines or water users). The water market in the Hunter region is likely to be very competitive due to the significance of this water for mines.

Summary

To allow the proposed Quarry to be properly assessed the WA requires:

- site-specific baseline data to be collected to validate the groundwater modelling and water balance predictions;

- additional hydraulic testing (eg pump testing, laboratory testing of core if available) to increase the confidence in the key input parameters to the groundwater model;

- continuous baseline groundwater level monitoring to allow assessment of seasonal variations in the water table which will influence pit inflow and baseflow predictions;

- baseline groundwater and surface water quality sampling to assist in the development of SSTV;

- the water balance, conceptual and numerical models are reviewed following the collection of additional baseline data and predicted impacts updated where required; and

- preparation of a WMP informed by the collection of required input data to clearly define baseline conditions and ongoing groundwater level, surface water level/flow and groundwater and surface water quality monitoring.

2.8 Surface water

A technical review of the surface water management aspects of the *Water Assessment* (WA) prepared by Umwelt was completed by Royal HaskoningDHV (RHDHV) to assess:

- the adequacy of the assessment methods, specifically in relation to:
  - uncertainties regarding proposed in-pit storage;
  - uncertainties regarding site water balance; and
- the adequacy and practicality of the proposed management measures.

This review has identified a number of issues associated with the functionality of the in-pit storage concept and the validity of the water balance modelling approach and assumptions. These issues and associated recommendations are discussed below.

Adequacy of the assessment methods – in-pit storage

The proposed Quarry is located within the Seven Mile Creek Catchment, immediately downstream of Boral's existing Seaham Quarry. Seven Mile Creek is a tributary to Grahamstown Dam. Grahamstown Dam is a major water storage that forms part of Hunter Water Corporation's water supply system for the greater Newcastle Region. Water balance modelling documented in Section 5 of the WA concludes that the Quarry can be operated without the need for discharges from the site to Seven Mile Creek.

Water balance results presented in the WA indicate that the proposed in-pit storage will potentially store large volumes of water for extended periods of time. By way of example, Figure 2.1 below shows the Year 30 results, which indicate that up to 200 megalitres (ML) of water could be stored in in-pit storage. This is equivalent to nearly 80% of the quarry's total water storage (at Year 30). The results also indicate that in-pit storage could be required for periods of up to three years.

Figure 2.1 Example water balance model results

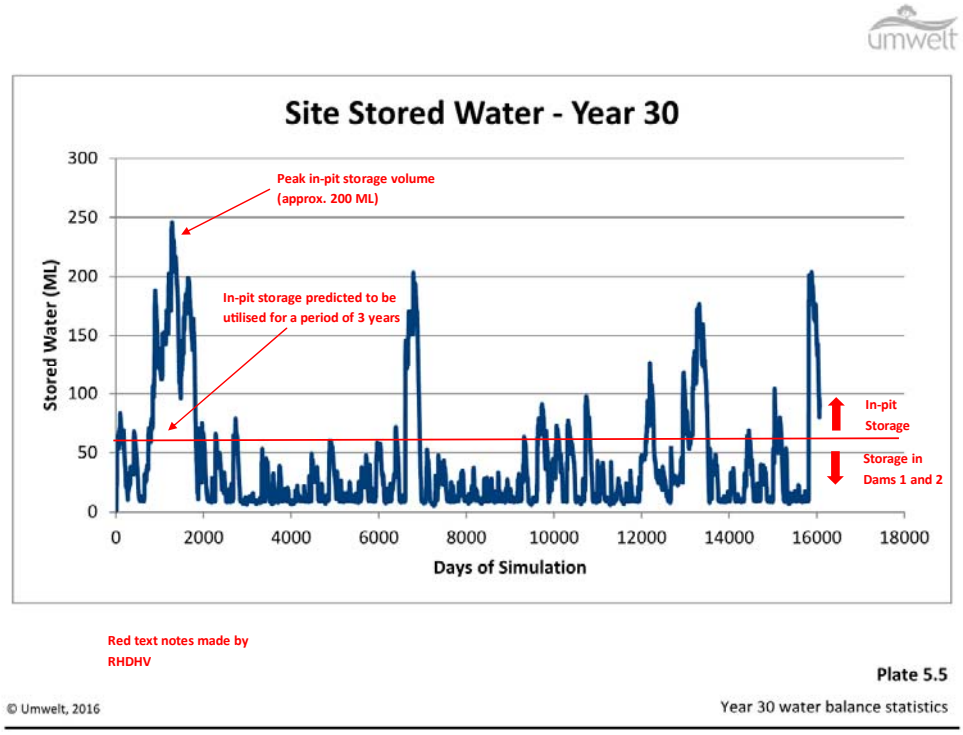
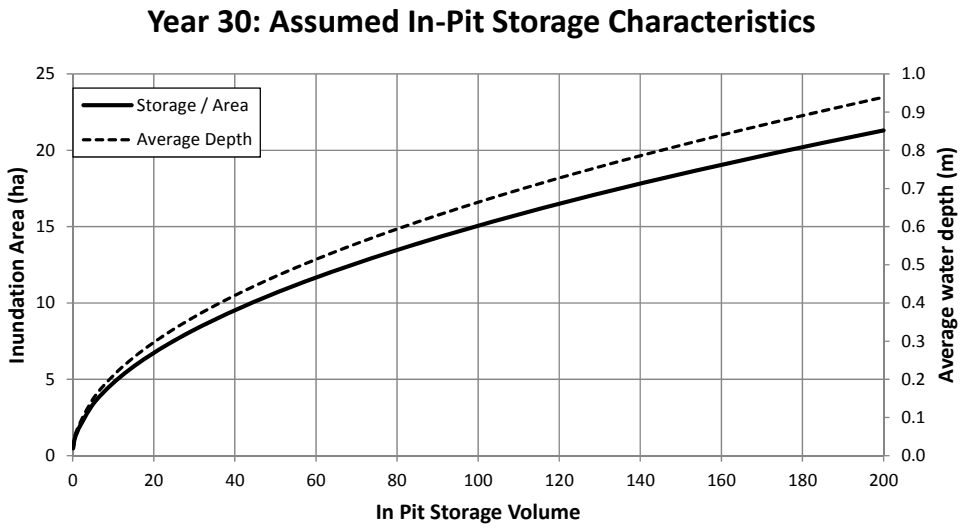


Figure 2.2 below shows the in-pit storage characteristics that have been applied to the water balance modelling. This information demonstrates that the assumed in-pit storage will comprise shallow inundation of the quarry floor. For example:

- 20 ML of in-pit storage is assumed to inundate 7 ha of the quarry floor (at Year 30);
- 100 ML of in-pit storage is assumed to inundate 15 ha of the quarry floor (at Year 30); and
- 200 ML of in-pit storage is assumed to inundate 21 ha of the quarry floor (at Year 30).

Figure 2.2 Assumed in-pit storage characteristics[1]



[1] Calculated by RHDHV using the equation provided in Table 5.2 of the WA

The WA has not adequately explained how the proposed in-pit storage concept will be achieved with the following significant concerns raised in relation to functionality:

- the quarry floor is expected to grade at 2.5% to the south making the shallow storage of water near impossible;

- the in-pit storage concept will require nearly the entire extraction area to be inundated with shallow water. The storage of water on the pit floor will therefore impede quarry operations and is therefore not considered to be a practical water management control; and

- if, on review the assumed in-pit storage concept cannot be achieved, a revised concept would likely significantly reduce the assumed evaporation area which in turn will materially reduce the potential for evaporation losses (see water balance assumptions below).

Adequacy of the assessment methods – water balance assumption

The EIS and WA stated zero discharge outcome is achieved (in the water balance) by the calculation of significant evaporation losses from water storages and what has been referred to as Exposed Area Demands.

It is understood that the Exposed Area Demands concept seeks to irrigate excess water to sections of the quarry that are not inundated by water storage, effectively increasing the evaporation area. Model results documented in the WA suggest that the combination of evaporation losses from the water storages and Exposed Area Demands will effectively manage water surplus situations under all climatic conditions.

The WA calculation of evaporation losses from the water storages and Exposed Area Demands are considered to be substantially overestimated in the model with the following significant concerns raised:

- Table 2.4 includes a summary of expected annual average rainfall and evaporation statistics. The stated average evaporation from a water body is 1,298 millimetres per year (mm/year) and the average rainfall is 1,127mm/year, equivalent to 87% of the evaporation depth.

  In a wet (90th Percentile) rainfall year, annual evaporation rates would be expected to be lower and the annual rainfall depth is reported as 1,484 mm/year in Table 2.3, thereby exceeding the average annual evaporation rate. Given that evaporation losses will only occur from a fraction of the site, it can be established with confidence that evaporation alone will not be effective in achieving a no discharge outcome at the Quarry, or any other site on the east coast of Australia.

- The evaporation losses calculates rates that are 60% higher than rates calculated using the typical method (ie evaporation rate = pan evaporation rate x 0.7 (pan coefficient)). While it is acknowledged that the use of pan evaporation coefficients greater or less than 0.7 can be appropriate, in the absence of any calibration data, the use of a methodology that calculates a more favourable evaporation rate requires justification.

  Using the typical method for calculating evaporation losses from the water storages will materially reduce the calculated evaporation losses and therefore increase the likelihood of site overflows in the water balance.

- Annualised rainfall runoff coefficients of 0.5 and 0.7 were calculated for WA, however given the proposal to store shallow water (ie in-pit storage) and spray irrigate (ie Exposed Area Demands) for the majority of the Quarry site a runoff coefficient of approximately 0.9 in wet years is expected to be more appropriate. A model parametrised to produce higher runoff in wet years would materially increase the volume of runoff, increasing the likelihood of overflows.

- Sensitivity analysis of the water balance model should be undertaken to assess the implications of various combinations of:

    - lower evaporation rates;

    - reduced evaporation areas;

    - higher runoff coefficients; and

    - reduced storage availability.

    The results from such sensitivity analysis could be used to verify the robustness of the water balance outcomes.

The review of the water balance indicates that:

- evaporation losses are substantially overstated in the water balance model due to the adoption of:

    - a method that calculates abnormally high evaporation losses; and

    - unrealistically large evaporation areas that encompass the entire site.

- runoff volumes are understated in the water balance model during wet conditions.

If appropriate adjustments are made to the water balance model it is expected that the results will predict that discharges will occur from the Quarry on a sub-annual basis. This will materially change the water management strategy and impact assessment documented in the EIS.

Mitigation measures

The following proposed water management controls are not adequately explained in the WA or EIS:

- in-pit storage is located up gradient of proposed Dams 1 and 2 therefore it unclear how:

    - water will be transferred from the dams into the in-pit storage when they are full; and

    - water will be held within the in-pit storages for a long period of time (as indicated in the water balance model results);

- the in-pit storage concept will require nearly the entire extraction area to be inundated with shallow water which will therefore impede quarry operations and is therefore considered to be impractical;

- if in-pit storage of up to 200 ML is proposed to be achieved behind an embankment or a series of embankments, the potential for embankment failure poses a material risk to the downstream environment and motorists on the Pacific Highway, which is located less than 1 km downstream of the site. The EIS has not identified or assessed potential embankment failure risks; and

- the assumed evaporation areas for water storages and Exposed Area Demands, whereby the water balance has assumed that evaporation losses will occur from 30 ha of the 30.4 ha disturbance area. This is an unrealistic assumption as it would require nearly 100% of the disturbance footprint to be either underwater or maintained wet for every hour of every day over the entire year.

Summary

To allow the proposed Quarry to be properly assessed the WA requires:

- review of the functionality of the in-pit storage concept;
- validity of the water balance modelling approach and assumptions; and
- confirmation on the effectiveness and practicality of the proposed surface water management controls.

2.9 Ecology

A technical review of the *Biodiversity Assessment Report* (BAR) prepared by Kleinfelder was completed by EMM to assess:

- compliance with the Biodiversity SEARs;
- compliance with Attachment A and Attachment B, OEH Biodiversity Requirements of the SEARs; and
- the decision not to refer the proposal under the EPBC Act.

Whilst the BAR has been prepared in general accordance with the SEARs, the below matters identify additional general requirements provided by the OEH and the EPBC Act.

OEH requirements

It is EMMs experience that OEH generally request an assessment against the *NSW Biodiversity Offsets Policy* for EISs using the *Framework for Biodiversity Assessment* (FBA) (OEH 2014) Appendix 7, Table 20 of the FBA, which contains all of the mapping and reporting requirements that should be included in the BAR (eg a table to outline each requirement and where it is located within the report).

Decision not to refer under the EPBC Act

A referral to the Commonwealth Department of the Environment and Energy (DoEE) has not been prepared for the proposed Quarry. Assessments of significance under the EPBC Act were undertaken for two birds, four mammals and six migratory species that determined there will not be significant impacts on these listed species.

Assessment information however is required to determine if the development will have a significant impact upon the EPBC listed Koala, as prescribed in *EPBC Act Referral Guidelines for the Vulnerable Koala* (DoEE 2014) (Koala Referral Guidelines).

Field work was undertaken for the species and signs of Koala activity were detected, including two individuals recorded within the study area.

The BAR refers to SEPP 44 and the *Port Stephens Council Comprehensive Koala Protection Management Plan* (CKPoM) and maps koala habitat within the study area however no reference is made to the Commonwealth *Koala Referral Guidelines* (KRG) which aim to guide decision making in relation to whether the project actions will adversely affect habitat critical to the survival of the Koala.

It is recommended that the BAR considers the KRG to assist in the decision to refer the project to the Commonwealth (or otherwise). If the assessment concludes that significant impacts are likely for the Koala, the project should be referred to the DoEE.

Summary

To allow the proposed development to be properly assessed the BAR requires:

- additional assessment to be provided against Appendix 7, Table 20 of the FBA to demonstrate that each requirement has been adequately considered and cross referenced within the report; and
- assessment to determine if the development will have a significant impact upon the EPBC listed Koala, as prescribed in the Koala Referral Guidelines. If the assessment concludes that significant impacts are likely for the Koala, the project should be referred to the DoEE.

2.10 Economic assessment

A technical review of the *Economic Assessment* (EA) prepared by the Hunter Research Foundation Centre (HRFC) was completed by Gillespie Economics to:

- the adequacy of the economic assessment;
- any uncertainties regarding the predicted economic benefits of the development; and
- review of economic justification.

Adequacy of the economic assessment

The SEARs in relation to the EA required:

- an assessment of potential impacts on local and regional communities, including impacts on social amenity;
- a detailed assessment of the costs and benefits (CBA) of the development as a whole, and whether it would result in a net benefit for the NSW community.

To meet the above requirements two types of analysis are needed:

- a CBA, which is the primary way that economists evaluate the net benefits of projects and policies, provide economic justification for a project and address the public interest; and
- a local effects analysis (LEA) to assess the impacts of the proposed Quarry in the locality

A CBA of the development would evaluate the all the impacts of the development in a consistent manner to determine if it is likely to have net benefits to NSW. Generic cost and benefit categories for inclusion in a CBA would include those outlined in Table 2.1.

Table 2.1 Potential incremental economic benefits and costs of the project

Category	Costs	Benefits
Net production benefits	Opportunity costs of capital equipment Opportunity cost of land[1] Development costs including labour, capital equipment and acquisition costs for impacted properties and biodiversity offsets1 Operating costs of quarry including labour and mitigation, offsetting and compensation measures Rehabilitation and decommissioning costs at end of the Project life	Value of hardrock resources Residual value of capital equipment and land at end of Project life
Potential environmental, social and cultural impacts of quarrying, processing and transport after mitigation, offsetting and compensation	Agricultural production Noise impacts Blasting impacts Air quality impacts Greenhouse gas impacts Surface water impacts Groundwater impacts Ecological impacts Road/rail transport impacts Aboriginal heritage impacts Historic heritage impacts Visual impacts	Wage benefits to employment Any non-market benefits of employment

[1] The value of foregone agricultural production is included in the value of land.

No CBA has been undertaken. Instead the EIS and EA identify demand for development (ie supply of aggregate to Newcastle and Lower Hunter, strong jobs and dwellings growth, convenient location proximate to the Port of Newcastle's continued expansion). Identification of demand for a project does not constitute a CBA and does not address the issue of whether the development will have net benefits for the NSW community.

The NSW Government (2015) also outlines a specific methodology for assessing the direct LEA of a mining project which has not been undertaken. Whilst the development it is not strictly a mining project it is difficult to understand why a generic methodology for assessing economic effects in the locality, should not equally apply to the proposed Quarry. Instead, the focus of the economic analysis is input-output (IO) analysis, which is a supplementary LEA method to examine flow-on effects.

Uncertainties regarding the predicted economic benefits

The EA includes the results of the IO analysis as a means of estimating the direct and flow-on effects to the regional economy (ie Hunter Region). The following anomalies evident in the application of the IO:

- It is based on "predicted production" which is unspecified. If the IO is based on maximum production from the quarry then, all other things being equal, it is likely to overstate impacts, since most quarries do not operate at maximum allowable production.

- No information is provided on the methodology for how impacts are assessed using the HRFC's proprietary model. The Generation of Regional Impacts procedure developed by the University of Queensland and recognised internationally, adopts a *'bill-of-goods'* approach where a detailed expenditure profile for a new project is developed, adjusted to producer prices and inserted into the IO table. The direct and indirect impact of this expenditure profile on a region is then determined. An alternative approach is to adjust total expenditure to producer prices and apply a multiplier from the existing sectors in the IO table.

  If the HRFC is using this latter approach then it is using the expenditure profile of the aggregated mining sector, which in the Hunter Region would be predominantly coal, to assess impacts of the proposed Quarry. If this is the case, then results are unlikely to be representative of the expenditure profile of a quarry.

- The HRFC's proprietary model is based on a business survey undertaken in 2001. To the extent that structural changes have taken place since that time, the model will not be representative of the regional economy.

- The HRFC identifies that 41 jobs per year will be generated over the 24 years of the project and that this totals 454 additional jobs (full-time equivalent jobs for a single year) over the 24 years of the project. However, this would appear to sum to 984 jobs. The difference is not explained by the HRFC.

- the Appendix to the HRFC assessment refers to an assessment of a university rather than a hard rock quarry.

Review of economic justification

The EIS and EA make no attempt at a CBA of the proposed Quarry. The justification on economic terms is simply in relation to security of supply of aggregate to the region, growth in jobs and dwellings and strategic location of the site. This is not an economic justification as required by the SEARs.

Summary

To allow the proposed development to be properly assessed the EA requires:

- a CBA and identification of net benefits of the development to NSW, as specifically requested in the SEARs;

- specific LEA using the NSW Government method for mining projects; and

- review of the IO analysis to more accurately assess the direct and flow-on effects to the regional economy.

2.11 Consultation

Boral were not consulted or engaged as a key stakeholder on the proposed development as required by the SEARs. This is despite the Eagleton Quarry being similar in nature and scale to Boral's Seaham Quarry which is an immediately adjoining neighbour (to the north).

Section 6.3 (Consultation with the local community) indicates that Boral's Seaham Quarry was consulted on the proposed development which is a factually incorrect statement and should be removed from the EIS.

It is noted that the EIS acknowledges in Section 6.3 (Consultation with local community) that 47% of respondents interviewed during the community consultation program saw no benefit of the Eagleton Quarry going ahead. Boral understand that a community group has now also formed in opposition to the proposed Quarry.

2.12 Rehabilitation and closure

The EIS, Quarry Plan figures and rehabilitation and closure plan are unclear in explaining how vegetation and topsoil are proposed to be stripped and stockpiled (ie depth, stockpile placement) during construction and managed during operation (ie prior to rehabilitation).

Sections 4.13 (Closure and rehabilitation) and 7.7.2 (Landform and geotechnical stability) propose a final landform that comprises a series of 10 m wide and 15 m high benches at the western end of the Quarry, while Section 8.5 (Final void) of the *Rehabilitation and closure plan* (Appendix Q) outlines that benches of 12.5 m wide for every 12.5 m of depth to provide a horizontal platform on which native vegetation flora species will establish.

Given the sensitive vegetation community to be impacted by the proposed Quarry, effective vegetation clearing, topsoil management and final landform will critical to ensuring the envisaged rehabilitation outcomes are able to be achieved.

2.13 Justification of proposal

In the light of above EIS assessment deficiencies, incorrect conclusions and inadequate mitigation measures, the evaluation and justification provided Section 9.0 (Justification of the proposal) should be reviewed and amended (as appropriate) to ensure the conclusion drawn are reflective of potential impacts.

3 Conclusion

EMM's technical review of the Eagleton Quarry identifies a number of deficiencies that warrant review and further information to ensure the proposed development can be properly assessed.

The EIS is not considered to adequately address the SEARs on the basis that the proposed Quarry:

- is not consistent throughout (ie project boundary, vegetation clearance, consultation, waste, mitigation measures);
- assessment of impacts for transport, cultural heritage, air quality, noise and blasting, groundwater, surface water, ecology, economics, consultation, rehabilitation and closure have not been undertaken in accordance with the required policies and guidelines and the findings are inaccurate; and
- assessment of the cumulative impacts of the proposed quarry operating in combination with Boral's Seaham Quarry in the locality has not been adequately addressed.