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GEOLOGICAL & ENVIRONMENTAL CONSULTANTS

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30 October 2015

The Secretary
Department of Planning and Environment
GPO Box 39
SYDNEY NSW 2001

Sent by email to:
carl.dumpleton@planning.nsw.gov.au

Attention: Carl Dumpleton

Dear Sir/Madam

Re: New Berrima Clay/Shale Quarry (PA08_0212 MOD1)
Response to DPI - Water's Groundwater Concerns

Thank you for forwarding the response from DPI - Water in relation to the Response to Submissions Report for the above project. I had an opportunity to review these comments and discuss them with their author, Mr Boyd Dent, Hydrogeologist with DPI - Water. As a result of those discussions, I am able to respond to the recommendations and related notes in the covering correspondence.

Recommendation 1

Provide an assessment of the likelihood and scale of perched water tables expected to be encountered at the New Berrima Clay/Shale quarry itself, including a risk assessment to groundwater resources, including consideration of the scale of the potential volume of groundwater that could be intercepted. … as there has been no baseline monitoring it has not been demonstrated that the watertable will not be intersected … [and] *based on the described geology (Section 2.3 of the EA) and details form the logs of the water bores, it is expected that some perched water tables will be encountered in the fractured shales and the interbedded sandstone lenses.*

Discussions with the driller who drilled the resource exploration holes (diamond holes) for Austral Bricks confirmed that groundwater was not intersected during the drilling of any holes within the Ashfield Shale within the resource area on the "Mandurama" property. This was established through monitoring make-up water levels required during drilling which confirmed no ingress of any water to the drilling column. This observation is consistent with the observations at Austral's Bowral Clay/Shale Quarry and within numerous road cuttings along the Hume Highway where substantial excavations into the Ashfield Shale are present. My recent discussions with hydrogeologists familiar with the Ashfield Shale have supported this observation. The observations from the two diamond drilling programs completed to date and the known very limited occurrence

Brooklyn Office:
First Floor, 12 Dangar Road, PO Box 239, BROOKLYN NSW 2083
Telephone: (02) 9985 8511 Facsimile: (02) 6361 3622 Email: brooklyn@rwcorkery.com

Orange Office:
62 Hill Street, ORANGE NSW 2800
Telephone: (02) 6362 5411 Facsimile: (02) 6361 3622 Email: orange@rwcorkery.com

Brisbane Office:
Suite 5, Building 3, Pine Rivers Office Park, 205 Leitchs Road, BRENDALE QLD 4500
Telephone: (07) 3205 5400 Facsimile: (02) 6361 3622 Email: brisbane@rwcorkery.com

of groundwater in the Ashfield Shale suggest any drilling program to locate perched water tables within the extraction area would need to be closely spaced – and then the information would have little value from a water management or environmental perspective.

As outlined in the Response to Submissions (Section 2.8), Austral's experience at its Bowral Quarry adjacent to the Bowral Brick Plant has provided an excellent understanding of the potential for groundwater intersections and perched water levels within the Ashfield Shale, particularly in close proximity to a substantial watercourse. The western boundary of the Bowral Quarry is approximately 25m from the centre of the Mittagong Rivulet (a watercourse with a catchment above the Quarry of 22km^2). The Mittagong Rivulet is a tributary of the Wingecarribee River. The attached **Figure 11** from the Response to Submissions (1995 EIS Figure 2.4) and **Figure 12** from the Response to Submissions (1995 EIS Figure 2.6) display the proximity of the existing Bowral Quarry to the Mittagong Rivulet.

The hydrogeological characteristics of the Ashfield Shale are such that occasional localised and negligible (unmeasurable) inflows of water occur following rainfall. The negligible inflows are attributable to the considerable thickness (4m to 6m) of residual clay that typically lies above the unweathered shale, as is the case on the "Mandurama" property. These inflows are typically manifested as damp areas on the exposed extraction faces. It is also worth noting that no seepage of water occurs from the adjoining Mittagong Rivulet into the Bowral Clay/Shale Quarry despite the base of the Quarry being 30m to 40m below the base of the rivulet.

In light of the above discussion, the likelihood of identifying (and quantifying) any perched water tables within the Ashfield Shale is likely to be very low within the Quarry Site, particularly above 660m AHD. It also needs to be recognised that there are no groundwater bores in the southern highlands that rely upon any groundwater resource located solely within the Ashfield Shale as it is well recognised that this geological unit contains negligible quantities of recoverable groundwater.

The likelihood of perched water tables, potential interaction with the existing regional groundwater table and risk assessment of each would be addressed within the Project's Groundwater Management Plan, i.e. within the Water Management Plan – a requirement of *Condition 3(18)* of PA08-0212. In addition, the Proponent has committed to apply for a Water Access Licence (with a zero allocation share at this stage) to ensure that in the unlikely event any groundwater is intercepted during extraction activities, that this water would be accounted for through the purchase of allocations relevant to the Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2011.

Recommendation 2

To support baseline data collection prior to groundwater interception, DPI - Water recommends the proposed monitoring bores be installed and monitoring commenced prior to commencement of extraction for Mod 1. … [to] *enable a better assessment of the ongoing project and its future should the nature of the surrounding district and its natural or modified environment change to any significant extent. The baseline information will also enable a better assessment in terms of the requirements of the NSW Aquifer Interference Policy.*

Austral accepts that three paired piezometers could be installed at locations to be identified in the Water Management Plan, i.e. around the perimeter of the approved extraction area. It is, however, respectfully requested that these piezometers are installed prior to extraction activities occurring in Stage 3 of the Quarry, i.e. prior to extraction occurring below 660m AHD, a depth noted as being at least 12m above the Wingecarribee River (648m AHD). Extraction at that stage would be approximately 640m from the Wingecarribee River.

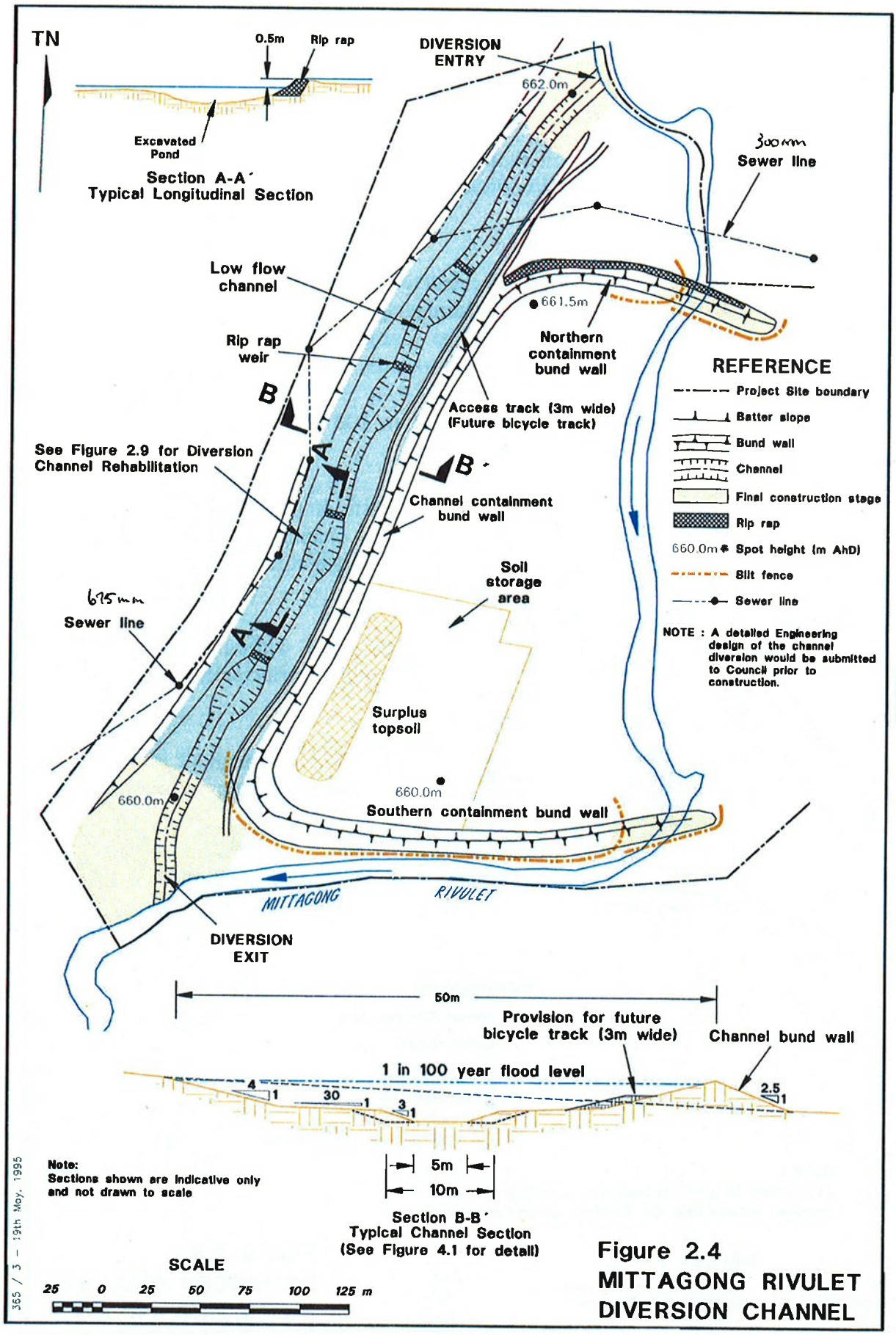

Figure 11: Bowral Quarry – Mittagong Rivulet Diversion Channel (Source: Response to Submissions – Page 38)

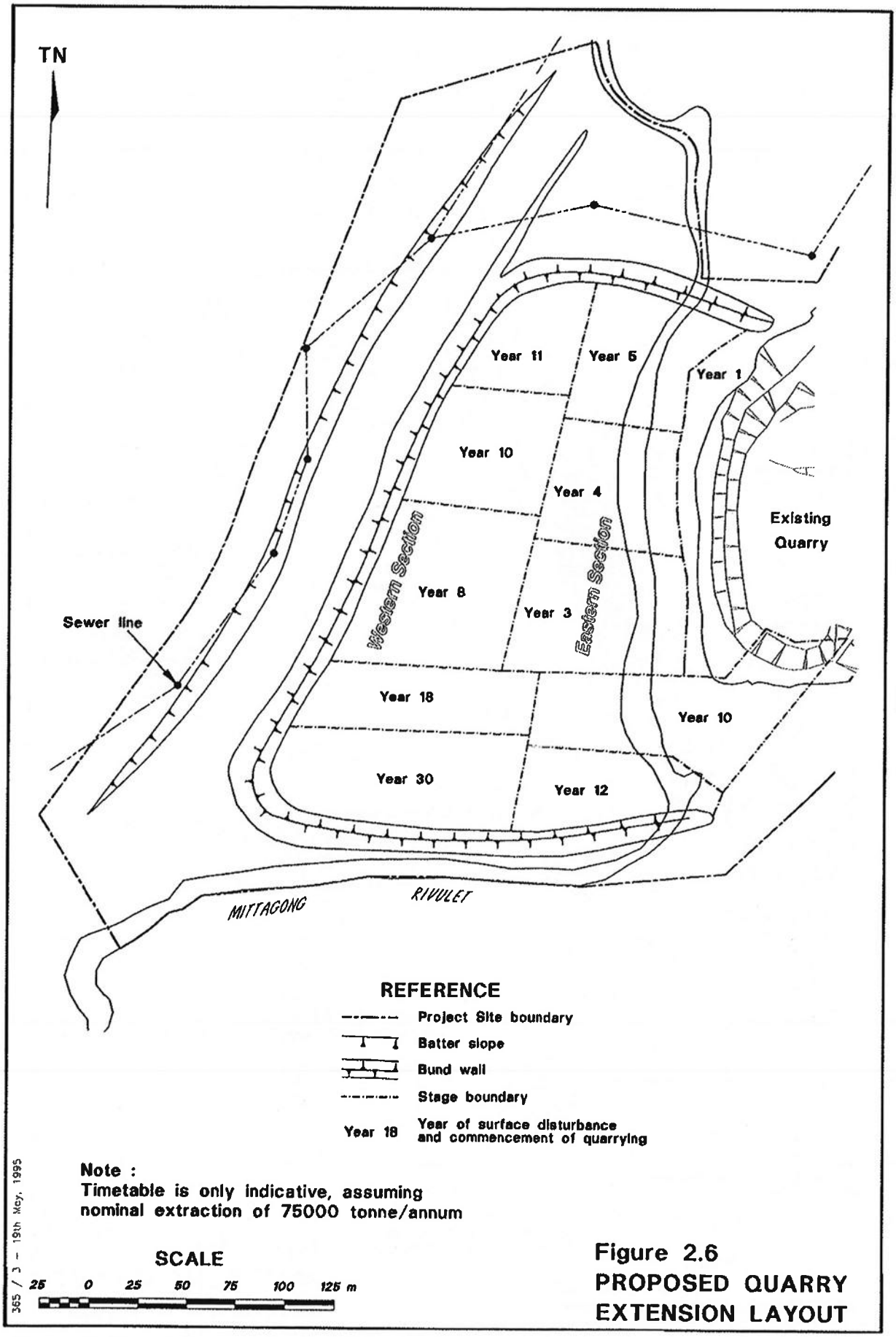

Figure 12: Bowral Quarry – Proposed Quarry Extension Layout (Source: Response to Submissions – Page 39)

Figure A provides a cross section through the extraction area showing the staged development of the Quarry. Extraction within Stage 1 (to 670m AHD) and the early parts of Stage 2 will effectively provide the materials required for the construction of the Central Visibility Barrier. It is likely that extraction in Stage 2 would continue for approximately three years after the construction of the Central Visibility Barrier before extraction reaches 660m AHD. Towards the end of Stage 2, piezometers would be installed and the Groundwater Management Plan component of the Water Management Plan would be prepared and submitted to DPE and DPI - Water.

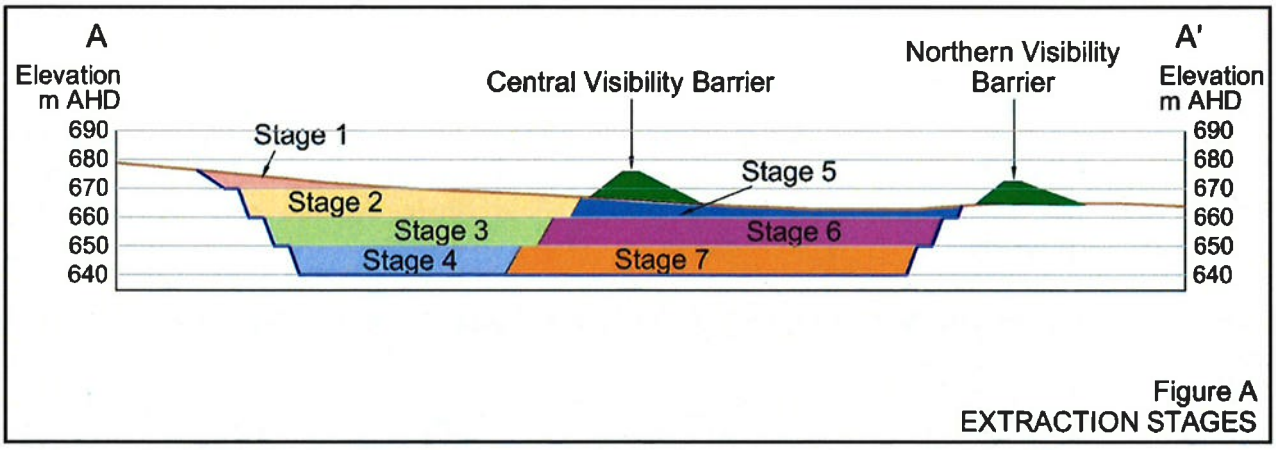

Figure A
EXTRACTION STAGES

This above approach is proposed as it is highly unlikely that the regional groundwater would be intercepted above 660m AHD based upon the height and topographical location of the extraction area and Austral's experience at the Bowral Quarry. It remains a very high probability that the regional groundwater table will not be intersected at all throughout the life of the Quarry.

It is proposed that the Groundwater Management Plan component of the Water Management Plan nominated in *Condition 3(18)(c)* of the project approval is prepared prior to the commencement of Stage 3 of the Quarry, i.e. prior to extraction proceeding below a depth of 660m AHD. Whilst it is highly unlikely that groundwater (even perched water tables) would be encountered between 660m AHD and 650m AHD, i.e. by the end of Stage 3, the installation of the monitoring bores at the time proposed would enable at least five years of data to be collected (if water is present) thereby satisfying the request from DPI - Water for the collection of baseline data in the unlikely event that the regional groundwater table is intersected below 650m AHD.

I have set out below the introductory text to *Condition 3(18)* and inserted some additional text for the Department's consideration should the approach outlined above be acceptable to both DPE and DPI - Water.

> *The Proponent shall prepare and implement a Water Management Plan for the project to the satisfaction of the ~~Director-General~~Secretary. This plan must be prepared in consultation with the EPA, SCA and ~~NOW~~ DPI - Water by suitably qualified and experienced persons whose appointment has been approved by the ~~Director-General,~~Secretary. ~~and~~ Parts (a) and (b) shall be submitted to the ~~Director-General~~Secretary for approval prior to the construction the ~~amenity bunds~~central visibility barrier on site and Part (c) shall be submitted to the Secretary prior to the commencement of extraction below 660m AHD.*

Recommendation 3

Rehabilitation of riparian land is to be detailed in the Landscape Management Plan.

There appears to be a misunderstanding on the part of DPI - Water regarding the riparian land adjacent to the Wingecarribee River on the "Mandurama" property. Given its agricultural status, the riparian land will continue to be managed to support the ongoing grazing activities on the property and no rehabilitation is proposed, nor required. It is respectfully requested that all consideration of rehabilitation of the riparian land not be included in the modified project approval.

Conclusion

I trust the Department recognises that the approach taken in assessing the groundwater issues for this quarry is based on considerable experience and would provide negligible risk to any groundwater resources (if present) within the Ashfield Shale beneath and surrounding the "Mandurama" property.

Should you have any questions regarding the information supplied, please don't hesitate to contact me.

Yours sincerely

Robert W. Corkery
Principal/Managing Director

Copy: Austral Bricks