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## INDEPENDENT EXPERT GROUP ADVICE ON THE ROCK SCOUR IN THE ENTRANCE, 29 AUGUST 2007

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### BACKGROUND

Following the detection in May 2007 of bathymetric changes in the Entrance that have occurred in the period since the 2005 Trial Dredging Program (TDP), the Port of Melbourne Corporation (PoMC) commissioned a series of further studies. These studies included a geotechnical “scour assessment” report, a hydrodynamic assessment based on the assumption that the Great Ship Channel may scour to uniform depth of –22 m CD, and an updated risk assessment of consequential environmental effects. These reports were tabled to the Inquiry considering the Channel Deepening Project (CDP) on 30 July 2007, after the 18 July 2007 Advice from the Independent Expert Group (IEG) was submitted.

The Inquiry has now asked the Secretary DSE to seek further advice from the IEG on the rock scour and erosion observed in the Entrance. The Inquiry has also requested the IEG’s advice on the submissions to the Inquiry on PoMC’s rock scour reports, as well as PoMC’s response to these submissions.

The scour assessment report provides on analyses of:

- i. the geology and geomorphology of the Entrance;
- ii. the seabed conditions of the Entrance;
- iii. the scouring process; and,
- iv. includes information on the historical development of the Great Ship Channel.

The report concludes that further rock scour is likely to occur after the completion of the Entrance dredging, but is unlikely to penetrate below –22 m chart datum (CD) (p. 21). This conclusion underpins the assessment by PoMC’s specialists of consequential or flow-on effects on physical and ecological processes and assets in the Bay.

### IEG ADVICE

The IEG considers that there is some uncertainty in the scour assessment report’s key conclusions regarding the maximum potential for further rock scour, for the following reasons:

1. The evolution of the observed ‘new’ scour holes has not been adequately explained having regard to the occurrence of scour holes that pre-date the TDP, including scour holes down to –25 m CD, as well as the existence of the older, adjacent canyon.
2. The analysis of the maximum depth of scour holes based on the predicted behaviour of non-cohesive materials, noting that, first, that the material being eroded material *is* cohesive, and second, that the assumed scouring process may not be dominant.

3. The harder rock layer observed in the Rip and Nepean Banks varies in its depth below CD and its extent, i.e. over the areas to be dredged for the CDP. Consequently, it may not serve to limit rock scour at approximately –22 m CD as proposed.
4. There are alternate explanations for the observed scour holes which could point to different scenarios for ultimate outcomes, viz.:
  - i. post-TDP erosion of loose material that had filled previous depressions, possibly as a result of the TDP itself;
  - ii. mechanical impact on ‘soft’ strata of mobile harder rock fragments derived from dredging (the scour assessment report hypothesis);
  - iii. progressive erosion of rock grains from ‘soft’ strata by high-energy currents and waves; and
  - iv. lifting and displacement of rock plates - including rock fractured by past blasting in the Great Ship Channel - by strong hydrodynamic forces.
5. Apart from the geology of the Entrance, the rate and vertical and lateral extent of any rock scour may be a function of:
  - the final dredging profile;
  - the nature of the disturbed rock surface of the dredged area;
  - the amount, movement and fate of rock spill; and,
  - the dominant scouring process (see point 4. above),

all of which are related to the dredging methods to be used. The explanation of the rock scour mechanism and its relation with the dredging method is thus of critical importance to the prediction of the future behaviour of the channel in relation to scour. These inter-relationships do not appear to have been fully addressed.
6. The scour assessment report concludes that the stabilisation of the Great Ship Channel after previous blasting appears to give reasonable grounds for assuming that any post-dredging scour will also stabilise with time. The IEG considers this view to be plausible, and suggest that this reasoning could be extended further towards assessing the probability and magnitude of scour after dredging, subject to the above points.

The IEG notes that this advice on the physical dynamics of rock scour issue is not conclusive, in part because the IEG does not encompass the full range of pertinent expertise. Further, a more in-depth review is needed. The IEG therefore suggest that the scour assessment report be subject to multi-disciplinary peer review of the inter-related factors involved. Ideally, the following expertise would be brought together to conduct a joint review:

- i. coastal geology/geomorphology
- ii. hydrodynamics and sediment transport
- iii. geotechnical analysis
- iv. dredging technology and methods, including blasting.

The IEG's 18 July 2007 Advice (p.2) noted the need to further assess both the rock scour occurring in the Entrance and consequential environmental effects. Depending on the outcomes of the suggested peer review of the rock scour, there may be a need to further address consequential effects. The experts assembled to consider the rock scour issue may also have the relevant expertise to consider any related implications for the Great Sands that result from potential changes in hydrodynamics.