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RE: DA2024/1216 - Gourlay Avenue BALGOWLAH NSW 2093

NORTH HARBOUR MARINA
Development Application Number: DA2024/1216

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PROBLEMS ASSOCIATED WITH LARGE VESSEL WAKES AND PROPELLER JETS

A Google Scholar search for "shoreline erosion of boat wakes" results in 16,100 entries, many of which are of Australian origin. It is surprising that neither The Statement of Environmental Effects nor the Aquatic Ecology Assessment mention the impacts of large vessel movement on erosion of the natural shorelines.

Shuster (2017, 2020) reports that his data indicate that wake height is roughly proportional to the cube of boat size (length). A simple comparison of boat size impacts indicates a problem that should have been investigated further in the context of this DA.

A 33m yacht will produce a wake which is 21 times higher than a 12m yacht. ($33^3/12^3 = 20.8$).

The problem is exacerbated by the fact that the wake energy (its erosive power) is proportional to the square of the wake height. It follows that the wake energy from the 33m boat in the example above is 433 times more than that of a 12m boat.

The problem described above will be seriously compounded by these large boats also using thrusters to manoeuvre in the tight space of the proposed navigation channel when approaching the wharf.

Turbulent jets from thrusters are associated with scouring of bottom sediments and flora at some distance from the source. The impacts of propeller and thruster jets on scouring in harbours have been widely reported in the scientific literature. Wei et al (2020) provide a recent review of the physics.

In the proposal, jets from the thrusters of large vessels will at times be confined along shelving bathymetry under the pontoons, towards the shore, disturbing moored boats in the marina and potentially scouring sediments for significant distances. The resulting re-suspension of sediment will cause considerable turbidity and, with an outgoing tide, potentially smother the *Zostera/Posidonia* bed east of the sailing club.

It is worth noting that this marina is probably the most exposed to oceanic weather of all marinas in Sydney Harbour. There is a direct line from the centre of the channel to the oceanic entrance and there is a significant history of large swells propagating into the harbour

and causing substantial damage. Any oceanic swells reaching the harbour would further challenge the difficult manoeuvring of large vessels.

Finally, earlier submissions have pointed to the very significant safety issues for the many small craft users arising from large vessel manoeuvring in an overly confined space.

In summary:

Documents in support of the DA failed to consider environmental damage likely from large vessel movements.

There is a huge multiplier (433) on erosion potential with size of boat (33m vs 12m).

The problem is exacerbated by the use of thrusters.

The likelihood of environmental damage to this small harbour arising from the proposal to berth large boats is high.

There are significant safety issues with large vessel passage.

References

Shuster, Robert, Douglas J. Sherman, Mark S. Lorang, Jean T. Ellis, and Frank Hopf. "Erosive potential of recreational boat wakes." *Journal of Coastal Research* 95, no. SI (2020): 1279-1283.

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Maoxing Wei, Yee-Meng Chiew, Nian-Sheng Cheng; Recent advances in understanding propeller jet flow and its impact on scour. *Physics of Fluids* 1 October 2020; 32 (10): 101303.