



BMT Commercial Australia Pty Ltd
Level 8, 200 Creek Street
Brisbane Qld 4000
Australia
PO Box 203, Spring Hill 4004

Our Ref: L.A10061.003.docx

Tel: +61 7 3831 6744
Fax: +61 7 3832 3627

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ABN 54 010 830 421

www.bmt.org

Ballina Shire Council
by email

Attention: Paul Busmanis

Dear Paul

RE: BALLINA QUAYS

Thank you for the invitation to review our previous advice regarding revetments within Ballina Quays. I have outlined below the important points that were considered in the initial advice of 1995 and how these may have changed in the intervening period. Lastly, I have indicated how some of these changes may lead Council to review its previous practices.

The two main coastal processes that affect sandy beach shorelines are longshore sand transport (along the beach induced by currents and waves) and cross shore sand transport (mostly due to beach slope changes).

Longshore transport is mostly induced by wave action due to wind and boat wake and is impacted by interruptions to the transport such as variations in canal alignment, changes to dominant winds and the introduction of structures, including reclamations, which physically interrupt sand movement. The best way to reduce longshore transport interruptions in existing canals is to have the shorelines / quaylines straight or smoothly curved without stepped changes.

Cross shore transport is mostly related to the mechanical stability of the sandy slope underwater i.e. its angle of repose. For marine sands in northern NSW this tends to be in the range of 1:7 to 1:10. In the longer term this slope may flatten due to changing conditions (increased boat wakes) or decreased average sediment size due to the introduction of finer silts. Typically, canal design favours steeper shorelines as this reduces water area and increases land area. The design slope of the Ballina Quays shoreline was nominally 1:7 and flattening of this slope will likely cause a scarp at the upper beach with sand moving downslope and reducing the water depth under moored vessels.

Relating these aspects to Ballina Quays, the key considerations are given below.

Regarding longshore transport:

- Longshore transport is evident along the canal adjacent to Burns Point Ferry Road e.g. scalloped beaches and sand buildup at stormwater outlets, and is most likely due to wind fetch across the river and possibly boat wake;
- There is little evidence of longshore transport in the other canals as evidenced by relatively straight beaches;
- Therefore, the consistent revetment line approach is most appropriate for the Burns Point Ferry Road canal.

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Regarding cross shore transport:

- Survey profiles across the canals in 2013 prior to the 2015 dredging campaign have been provided by Council. As expected, these show a flattening of the 1:7 upper profile resulting in a beach scarp and reduced depth around the pontoon alignment. The Council reports needing to reprofile the canals approximately every 5 years. Of note is that the middle of the canals appear to maintain the design depth over time. Regarding revetment location, positions further from the kerb will have higher scarps after profile flattening and will require deeper revetments and in some situations may require a formal revetment design to resist undermining and collapse from passive soil pressures on the landward side of the revetment.

Other points to consider are:

- The amenity of the beach is highest above high water where the sand is dry, and recent aerial photography shows this to be typically between 2-4m from the kerb;
- The stipulation of a fixed width from the kerb provides equity for landowners in their access to the canal and aesthetics as a revetment alignment that varies significantly between adjacent blocks may intrude on views and usage amenity;
- The fixed extension of 18m from the kerb to end of pontoon seems well maintained and provides a clear waterway for safe navigation.

Specifically, for the property 135 Riverside Drive:

- The prominent quay line is unlikely to affect the beaches on adjacent properties due to the absence of appreciable longshore sand transport;
- There is likely to be a restricted usable beach width at the property and the existing scarp may deepen as the bank slope flattens. If future maintenance is delayed beyond the normal 5 years this may result in undermining of the revetment;
- It is noted that the Engineer's reports say the previous timber wall was built around 2014, however it was located 4.4m from the kerb which appears in contravention to the 25-8-1999 Council resolution.

In conclusion, this review has found that evidence of longshore transport is present along the Burns Point Ferry Road canal but not in the secondary canals. Profile flattening appears reasonably consistent throughout the system. Therefore, it is recommended that a consistent revetment alignment of 2m from the kerb be maintained for the straight section of the Burns Point Ferry Road canal. For the secondary canals a consistent revetment alignment is not as critical, however significant extension past the 2m alignment may involve more formal revetment design considerations and some loss of equity where major variations between adjacent blocks causes aesthetic issues.

Yours Faithfully



Malcolm Andrews
Senior Principal Coastal Engineer
BMT

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Figure 1 Ballina Quays Overview (Nearmap 11 June 2019)

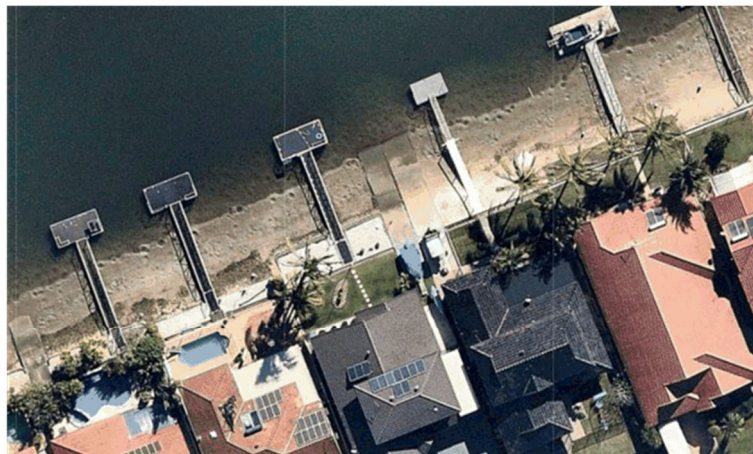


Figure 2 135 Riverside Drive (Nearmap 11 June 2019)

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