

## 7 Siltation in Mooring Areas

There is concern with shallowing in the vicinity of some mooring areas within the main harbour channel.

Apparently, consideration is being given to dredging in an attempt to improve these areas. However, considerable caution should be exercised in this regard. I have been involved in detailed investigations of sediment transport in subtidal areas of estuaries and these areas are much more dynamic than is commonly appreciated.

Sandy areas in such estuarine channels, subject to high tidal velocities, experience very high rates of sediment transport. This is particularly the case in lower harbour areas, where there is active recirculation of sediment between the inner and outer harbour areas. For instance, in some sandy, subtidal areas along the edge of the main channel, sediment transport rates could well be 100 times higher than those in the environments visible above low tide. Therefore, the benefits of any dredging could be very short-lived. In deeper areas with very high velocities, estuarine channels are commonly shell-lagged as the sediment transport rates vastly exceed sediment supply.

Sandy sediments in high velocity subtidal areas of main harbour channels, such as the mooring area in question, can also contain very high levels of shellfish - presenting disposal difficulties for the dredged sediment and providing potential for adverse effects on biota.

Therefore, I would strongly advise investigation of these areas if any dredging is seriously contemplated. Simple investigations (e.g. SCUBA inspection of bedforms) by any experienced marine sedimentologist should be adequate to judge the usefulness or otherwise of any dredging. A "suck it and see" approach is not appropriate in these very dynamic environments.

## 8 Changes Near Entrance

Surfers and boat users at the August meeting advised that navigation channels in the entrance area occasionally change and that NZ Pilot instructions can be wrong on some occasions. This has apparently caused difficulties for at least one major yacht in the past.

A desire for occasional hydrographic surveys of this area was expressed. Simple occasional runs by the Harbourmaster were all that was envisaged with movable channel marker buoys that could be moved to mark changes.

It was also noted that, under wave conditions, there is often user conflict between surfers and boat users near the outer bar. These can be serious in outer areas where boaties often have to travel at some speed to get through gaps in the waves and can come quite close to surfers. The Game Fishing Classic was cited as a recent occasion when such problems were experienced. The Harbour Committee will probably need to meet with surfers and boaties to thrash out some sensible guidelines to minimise the risk of a serious incident.

## 9 Harbour Infilling

There is general ongoing concern in regard to harbour sedimentation as a whole. There also appears to be some confusion between this process and dynamic changes in the lower harbour.

It should be noted that there has been extensive work on sedimentation in Whangamata Estuary. This includes the early characterisation work by Angela Sheffield and a more detailed study of harbour infilling rates by NIWA.

The NIWA study found that rates of harbour infilling prior to human settlement were generally very low – typically less than 0.1-0.2 mm/yr. However, this rate of infilling was accelerated by human activities in the catchment – with average rates of infilling of around 5-7mm/yr in some decades. Over the last 100 years, the rate of infilling appears to have averaged about 2-3mm/yr – more than ten times the rate of infilling prior to human settlement.

Nonetheless, even the highest rates of infilling are obviously much lower than the sedimentation noted in parts of the lower harbour. The changes in the lower harbour relate not to harbour infilling but rather to dynamic channel changes associated with the very high rates of sediment transport in these areas.

In simple terms, sandy sediments are very actively re-circulated between the lower harbour and the outer bar and beach. The sediment transport pathways consist of areas dominated by ebb-directed sediment transport and other areas dominated by flood-directed sediment transport. Collectively, these form an interdigitated pattern of sediment recirculation not unlike a repeating figure of 8. The interdigitated ebb- and flood-directed pathways occur right to the top of the harbour, but the most active sediment transport occurs in the lower harbour. The pattern of sediment transport is complex and has not yet been well defined - though the broad elements can be relatively easily determined by simple field investigations.

It is very important to appreciate that the dynamic changes in the lower harbour are quite unrelated to the relatively slow rate of net harbour infilling and that these two separate processes have quite different, though significant effects.

For instance, the infilling of the access channel and the changes in the mooring area relate largely to the active sediment transport in the lower harbour and not to harbour infilling. On the other hand, changes such as the expansion of the mangroves may well be very strongly related to the harbour infilling.

- 2.30 Another disposal option which could be used to mitigate the loss of the resource would be to stock-pile the sediment where it would be available for future use. Such stock-piling might even be able to avoid the loss of the sediment from the coastal system since it would be available for future beach or dune nourishment (or other marine placement options) - within a suitable designed and appropriate programme could be formulated. Alternatively, the stock-pile would provide a long-term source for public benefit.

A further option could be to sell the resource at an appropriate commercial rate and use the funds for environmental off-set works. However, care would be required with this option to avoid setting an undesirable precedent. As a general rule, retention in the coastal sediment system - particularly beach or dune nourishment - should be the preferred option for sandy sediments.

- 2.32 Requiring appropriate financial compensation for the loss is a further possible option.

### 3 Maintenance Dredging of the Entrance Channel

- 3.1 The proposal involves the dredging of an all tide channel 500 metres long stretching from the marina basin to the main harbour channel. The sides of the deepened channel will be protected with rock laid over geotextile fabric. This channel will extend across what is presently an inter-tidal area.
- 3.2 The impacts of this channel on ecological values and other harbour users is considered in the evidence of Ms Wood and Mr White. My evidence addresses only the maintenance dredging requirement to maintain this channel and the disposal of these dredged materials.
- 3.3 Maintenance dredging will take place as and when required. The AEE estimates this requirement at 6000 cubic metres per year, but acknowledges the difficulty in making reliable predictions.
- 3.4 I would reinforce this latter point and note that experience in other similar shallow harbours indicates that the maintenance requirements could possibly be much higher than estimated. A significant maintenance dredging requirement is also suggested by the experience to date with maintaining a much lesser channel across this region - for the purpose of providing access from the boat ramp to the main channel. I understand that the district council requires to remove about 3000 cubic metres per year to establish this much less significant channel and that dredging is focused primarily on providing access over summer rather than all year round.
- 3.5 It is also important, following from the considerations discussed in section 2, that the maintenance dredgings (largely sands and shell) are appropriately disposed. At this stage, the details of such disposal are vague and uncertain. Therefore, if the proposal proceeds, it should be subject to appropriate agreement with this Council as to the disposal of maintenance dredging. Given the large volumes that could be involved, it may even be appropriate to require a separate consent process for any such dredging.

*This has not  
been done.*

*Don't agree with  
as all*

*2.31*  
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#### 4 Natural Character

- 4.1 The preservation of the natural character of the coastline is identified as a Matter of National Importance in the Resource Management Act (Part II, Section 6a).
- 4.2 The definition of natural character is still subject to some uncertainty and debate in coastal management circles and I am presently involved in working with various consultants to further clarify this and related issues - with a report due later this year. Nonetheless, the prevalent interpretation to date within case law is that natural character is that character that derives from natural (as opposed to man made elements) elements of the coast - i.e. coastal landforms, vegetation, the operation of natural biological and physical processes, etc.
- 4.3 As such, the present proposal will result in some loss of natural character at the site - since the proposal involves replacement of the saltmarsh wetland, together with areas of mangroves and inter-tidal flats, with the marina development. i.e. The proposal replaces an essentially natural coastline (though modified and backed by coastal development) with an essentially developed coastline. Biological and physical processes will also be modified by the changes accompanying the development, further reducing the naturalness of the coastline in this area.
- 4.4 It needs to be emphasized that the adverse effect being discussed is the loss of natural character. Whether the marina development is regarded as aesthetically more or less pleasing than the present coastline is not the issue. That is a subjective judgement that will vary considerably among individuals.
- 4.5 The significance of the loss of natural character is considerably enhanced at this site by the significance of the natural environments that will be lost - this latter aspect is discussed in the evidence presented by Mr White and Ms Wood. As noted by these reports, both the wetland and other inter-tidal environments impacted are extremely important - in terms of biological productivity and habitat, as well as intrinsic and aesthetic values.
- 4.6 Some attempt at mitigation of the loss of natural character is provided by the attempt to retain an area of mangroves within the marina basin. If the mangroves survive (which matter is further discussed in Mr White's evidence) this may partially mitigate the adverse effect of the proposal - though it is not clear what will be the consequences (or the mitigation response) if the mangroves die.
- 4.7 Regardless of the success of the mangrove retention, the overall effect of the development is a loss of natural character and, despite the present modified nature of the general location, the loss is significant because of the significance of the natural environments that will be lost.

#### 5 Summary

- 5.1 The construction of the present proposal will result in the net removal of a large volume of sandy sediment from the coastal system. It is unlikely to be reasonably practical to return this resource to the coastal system by way of beach or dune

nourishment, except to a very minor extent. However the present proposal to dispose large volumes to the marina platform, considerably exceeding the reasonable requirements for filling of this area, is inconsistent with sustainable resource management. Other more appropriate uses of the resource and/or financial compensation should be required if the marina proposal proceeds.

- 5.2 Maintenance dredging of the marina entrance channel is difficult to estimate and may considerably exceed the estimate of 6000 cubic metres per year assessed in the AEE. In addition, firm details for appropriate disposal of this material have not yet been determined and should be a condition of any consent or require a separate consent process.
- 5.3 The proposal will result in loss of natural character and, despite the present modified nature of the site, that loss is significant.