

## 6. PLEASANT POINT YACHT CLUB AND RIVER CHANGES

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The purpose of this report is to advise the Board about the feasibility of bank stabilisation and dredging in the lower Avon River as requested by the Pleasant Point Yacht Club to protect both salt marsh and club facilities.

### BACKGROUND

#### Lower Avon River Working Party

In the year 2000 a Lower Avon River Working Party was set up by the Board to seek stakeholder input to an asset management plan for the lower Avon River. The Working Party met three times but essentially only considered one issue - erosion and sedimentation around Bridge Street and its effect on the Pleasant Point Yacht Club and adjacent salt marsh. Although these river processes are covered in two reports by the National Institute of Water and Atmospheric Research Limited (NIWA) there were requests for further information about causes and costs. This report contains that further information.

#### Kibblewhite Street Stopbank

The potential for erosion and sedimentation became a major issue during 1997 hearings for a resource consent to relocate the Kibblewhite Street Stopbank. Submitters opposing the stopbank relocation gave evidence that the project would lead to the flooding of New Brighton, damage to the bridge and yacht club and loss of large areas of salt marsh. Expert evidence from Dr Murray Hicks of NIWA gave the opinion that major negative effects were unlikely, and his views have been substantiated to date. However, his evidence and a subsequent report by Maurice Duncan of NIWA have been interpreted by the club to suggest that its facilities are at some risk.

### PLEASANT POINT YACHT CLUB CONCERNS

The Pleasant Point Yacht Club is concerned that as a result of Council actions over the years the lower Avon River is changing its alignment in the vicinity of Bridge Street. The club says that river movements, particularly as a result of the stopbank relocation (1999) and Naughty Boys Island cut (c1946), are causing:

- Erosion of the east riverbank upstream of the bridge.
- A risk that the river will change from a south-easterly to a more southerly alignment through the bridge and impinge on the yacht club's river frontage, causing undermining and destabilisation of a retaining wall and landing stage.
- A shift in the channel east of the club, leaving a sand bar in front of the club affecting the start/finish area.
- Loss of valuable salt marsh in the two erosion areas.

These sites are shown in figure 1 (from Duncan 2001) attached.

### RIVER PROCESSES

#### General Comment

The Avon River has a small catchment and a gentle gradient. The energy available for channel formation is small and changes happen slowly. Human intervention has modified naturally occurring river processes. Dr Hicks says:

*“Over the past 70 years, at least five construction activities in the Avon channel have affected the channel in the area of interest: the closure of the second channel on the western side of Rat Island about 1930, the Naughty Boys cut in about 1946, the Kerrs Reach cut in 1949-50, the new Bridge Street bridge that was built in 1979, and the (pre-1961) Kibblewhite Street stopbank. They were excavated to allow flood waters to drain out through the Avon channel more quickly.*

*It is relevant also that the lower Avon channel was heavily dredged in the late 1940s to early 1950s and then again in the late 1960s to early 1970s. The effect of this would have been to further increase flows, while starving the reach around Kibblewhite Street of sediment since cross-section records show that the upstream dredging 'holes' trapped sediment (as discussed in Hicks 1993).*

*Finally, channels tend to meander as a mechanism to dissipate the energy of their flows uniformly along their length. A cut to straighten a meander locally increases the flow energy, and so the natural response of a river is to intensify its meandering downstream in order to dissipate this energy excess."*

*All of these effects can be expected to induce bank erosion, which typically in river channels occurs on the outsides of bends where the velocities are greatest and the flow plunges down the bank. Thus the erosion observed since about 1945 beside the Kibblewhite Street 'elbow' - at the outside of the first bend downstream from the Naughty Boys cut - is to be expected, as was the propensity for a meander to develop upstream of the previous Bridge Street bridge." (slightly edited from Hicks 1997 evidence).*

However, *"It is important to appreciate that in terms of flow rates the lower Avon past Kibblewhite Street is predominantly a tidal channel, rather than a river channel, and that upstream tidal flows should be of similar importance in channel formation as the downstream flows."*

### **Present-Day River Changes**

Giving evidence to the Kibblewhite Reserve stopbank hearing Dr Hicks said, *"The key question is whether, as a result of the stopbank removal, the river will attempt to take a direct line from the new corner of the stopbank to the bridge. There are several reasons why this is considered unlikely. First, the bridge abutments fix the position of the channel and align the flow to its present NW-SE trend. Second, because of the strength of the flood (incoming) tidal flows into the Avon, the channel alignment under the bridge will be influenced by the approaches on the estuary side as well as on the river side. Third, the trend towards meander development - in part to compensate for the impact of historical channel works on the strength of downstream flows - should continue (i.e., natural channel straightening is not expected), with channel alignment being controlled as much by deposition on bars as by the bank-line"*.

Dr Hicks believed *"that as a consequence of the stopbank being removed, the river will trim back the salient created by the present stopbank elbow, eroding a relatively shallow 'bite' - about 10 to 15 m wide at its widest, spanning about 140 m and centred near the elbow - but will not radically 'cut the corner' into the bridge approach"*.

At the present time a point bar<sup>1</sup> is building upstream of the bridge and appears to be diverting flow around the western side of the channel. The shape of the bar suggests that it is being formed by deposition of sand on the outward tide. If its growth continues we might see the bar merging with the salt marsh at the bend and increasingly directing the flow away from the east bank.

Referring to the bar beside the yacht club Duncan says, *"... the erosion presently being experienced on the left bank both upstream and downstream of the bridge approaches, and changes in the bar downstream of the Yacht Club, will likely continue for some time irrespective of any changes to the Kibblewhite Street stopbank. This is because this part of the channel, with its complex mix of tidal and river flows, still appears to be adjusting to the new Bridge Street bridge and because of the natural inclination of the channel to meander". (Duncan 2001)*

### **River Monitoring**

The Council is monitoring the river position with cross section surveys and photographs to record changes in the channel and banks.

### **THE CLUB**

The Pleasant Point Yacht Club is sited on Rat Island downstream of Bridge Street. The island and riverbed are Crown land. A building visible on the site in a 1926 aerial photograph suggests that the club or a predecessor has had a presence on the island since at least that time. According to Hicks Rat Island was a true island until the 1930s when the channel to the west was blocked, presumably to replace one of the two early bridges with a cheaper causeway. The present bridge was built in 1979 on a new alignment some 50 metres upstream.

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<sup>1</sup> A point bar is a sand/silt/mud accumulation on the inside of a bend.

The club's retaining walls and landing stages on the riverbank have shallow foundations. According to the club the foundations have been partially exposed in a recession of the riverbed of several centimetres. The club reports having to concrete around the landing stage piles to stop the landing from floating at high tide. They are concerned that the concrete retaining wall (about 1.2 metres high by about 100 metres long) may be undermined.

The club says that the Council is liable for the erosion and deposition affecting it and that it should remedy these effects by bank protection and dredging.

## **REMEDIAL MEASURES**

Remedial measures proposed by the club are:

1. Stabilise the river on the present alignment.
2. Dredge the downstream sand bar.
3. Repair the effects of erosion.
4. Protect eroding salt marsh.

Alternative option:

5. Adjust activities to accommodate river changes.

### **Stabilise on Present Alignment**

It is suggested that the Council protect the east bank upstream of the bridge from further erosion and stabilise the river on its present alignment. A practical means of doing this would be to face the bank below mid-tide with crushed rock placed from a barge. The cost of this work over the 200 metre length upstream of the bridge is estimated to be \$50,000-70,000. There is \$20,000 available subject to the Director of Finance's approval being obtained to reallocate capital expenditure budget to operating expenditure.

Gravel has been used in similar circumstances both upstream and around the estuary shoreline for bank protection. However, gravel banks are characteristic of the estuarine part of the river and would add a further unnatural element to the river-scape, detracting from the remaining natural character of the salt marsh. It would further constrain the river's movements and would alter the immediate habitat, albeit in a small area and by an unknown amount.

The work would require a resource consent from Environment Canterbury and the Christchurch City Council. Because this part of the river is within the Coastal Marine Area the Department of Conservation would take a strong interest and is likely to oppose the proposal on the grounds that it is not necessary.

From Dr Hicks' evidence and recent observations it is not at all clear that protection of the salt marsh is necessary. The bank erosion which is occurring is not extensive, and is not a clear threat to the bridge nor to banks downstream. The erosion reported by the club is relatively minor and does not obviously result from erosive currents which are, at least at present, directed away from the club's frontage.

### **Dredge the Sand Bar**

The club wishes the Council to dredge at least half a metre from the sand bar beside the club to ease the passage of sailing dinghies. The amount of sand to be removed is about 4,000 cubic metres, at a cost estimated to be not less than \$65,000. The estimate assumes that the sand can be disposed of as cover material at Bexley Wetland. If this is not possible the cost could triple through transport and tip fees. The operation would require a resource consent, which is likely to be obtained.

With the river on its current alignment the sand bar is quite likely to be rebuilt over a time scale of maybe 10-15 years.

Dredging is a maintenance activity and there is no maintenance budget available.

## **Repair Effects of Erosion**

The effects of erosion at the club could be largely repaired by replacing a lost layer of riverbed material with a layer of gravel. Because river velocities never exceed 0.6 metres per second a cover of fine gravel could be expected to remain in place.

Such a gravel layer would probably also require a resource consent. While it would be seen as non-natural it would probably attract less opposition because the locality is already modified by the retaining walls.

The club has not suggested that the Council assist with underpinning the retaining wall or landing stage.

## **Protect Eroding Salt Marsh**

Protection of eroding salt marsh vegetation has not been pursued by the Council to date, nor favoured by others including the Department of Conservation and Environment Canterbury, because the small losses involved are seen as natural and transitional processes. Cycles of erosion and deposition are expected in a dynamic environment and are part of what defines naturalness. Relatively large areas of exposed mud both upstream and downstream of Bridge Street are available for salt marsh regrowth in remnants of old river channels which are gradually filling. Much of the area is still too low for recolonisation by salt marsh vegetation but as mud levels accumulate there will be a time when significant areas of salt marsh will re-establish. Surveys indicate that mud levels need to lift by 0.3 to 0.4 metres for recolonisation by jointed wire rush, etc.

## **Adjust Activities to Accommodate Change**

It seems possible, at least in principle, that the club could accommodate itself to river changes by changing its operations and facilities. To date there has been little consideration of alternatives to the proposed dredging and bank stabilisation. With bank protection and dredging now seen to be major costs the possible alternatives need to be considered.

## **COUNCIL LIABILITY?**

There are a number of reasons for believing that the Council does not have an obligation to the club.

- (a) The club sits on Crown land and the Council has no obligation to protect this land.
- (b) The terms of the club's lease, while not specifically mentioning the river, clearly stipulate that the maintenance of facilities will be the club's responsibility.
- (c) Past river management was carried out to make possible the safety of the City in which club members have residence. River management was carried out in a responsible and lawful manner.
- (d) The landing stage and retaining wall allegedly being threatened by erosion are inadequately constructed for the site. The foundations are too shallow for foreseeable fluctuations in bed level.

## **IS THE STOPBANK RELOCATION RELEVANT?**

The Kibblewhite Street Stopbank resource consent hearing precipitated a significant confrontation over potential environmental effects. Dr Hicks' report (which was also the basis of the Duncan report) was submitted in evidence at the hearing. Both reports have been quoted because they are informative and come from neutral and expert sources. Nonetheless the stopbank itself and its relocation is of little relevance to the present discussion.

This is fairly clear in Dr Hicks' report which is available separately to Board members.

## **CONCLUSIONS**

1. Effects reported by the club are caused by the process of adjustment to river channel changes over 70 or more years, and the adjustment process is likely to continue. Changes will be slow and are not expected to be as severe as suggested by the club. The changes are affecting some club activities.

2. It is not clear that bank protection is necessary. The bank erosion which is occurring is not extensive, and is not a clear threat to the bridge nor to erosion downstream. The erosion reported by the club is relatively minor and does not obviously result from flow impinging on the club's frontage.
3. Dredging the sand bar beside the club is possible but expensive and is likely to be required again within a time of the order of 10-15 years. Alternatives should be considered before the Council could give serious consideration to the proposed dredging.

#### NATURAL + PEOPLE + ECONOMIC STEP ASSESSMENT

#	CONDITION:	Meets condition ✓/0*	HOW IT HELPS MEET CONDITION:
<b>The Natural Step</b>			
N1	Reduce non-renewable resource use	✓	Cautions against unnecessary work.
N2	Eliminate emission of harmful substances	✓	Postpones in-river work.
N3	Protect and restore biodiversity and ecosystems	✓	Advocates preserving diversity.
N4	People needs met fairly and efficiently	NA	NA - See People Step + Economic Step.
<b>The People Step</b>			
P1	Basic needs met	0	No basic needs.
P2	Full potential developed	✓	Opportunities to build understanding between Council and club.
P3	Social capital enhanced	0*	Neutral at best. P3 potentially conflicting with N1, N3.
P4	Culture and identity protected	0*	Should ideally receive input from tangata whenua.
P5	Governance and participatory democracy strengthened	0	Staff/users interaction recommended.
<b>The Economic Step</b>			
E1	Effective and efficient use of all resources	✓	Effectiveness of resource use to be investigated.
E2	Job rich local economy	0	Not applicable.
E3	Financial sustainability	✓	Sustainability being considered.

#### Staff

- Recommendations:**
1. That the Parks and Waterways Unit should continue to monitor river channel movements for changes which demonstrate that a significant risk is presented to Council or other assets.
  2. That the Parks and Waterways staff liaise with representatives of the Pleasant Point Yacht Club to establish the feasibility and cost of alternative ways of accommodating club operations to the river environment.

#### Chairperson's

**Recommendation:** That the abovementioned recommendations be adopted.