



Report 09.687  
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Committee Hutt River Advisory Subcommittee  
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## Hutt River gravel analysis report

### 1. Purpose

To inform the Subcommittee of the results of the analysis of the latest riverbed survey, conducted between December 2008 and April 2009.

To obtain Subcommittee endorsement of the proposed gravel management policies for the period 2009-2014.

### 2. Significance of the decision

The matters for decision in this report do not trigger the significance policy of the Council or otherwise trigger section 76(3)(b) of the Local Government Act 2002.

### 3. Background

The Hutt River cross section information forms an integral part of the analysis of the hydraulic capacity of the river channel and a means of monitoring gravel bed movement for gravel extraction and general river management purposes.

Regular surveys of the Hutt River, at approximately five yearly intervals, have been undertaken since 1987, with the latest survey completed during the summer of 2008/2009.

In 2001 a set of guidelines were established in order to determine appropriate mean bed levels for the Hutt River. Recommended minimum and maximum mean riverbed levels were determined in order to maintain the effectiveness of current flood control measures.

A 25 year flood event in the Hutt River on 6 January 2005 resulted in higher than anticipated flood levels in the Hathaway Avenue area. It was believed that the increased flooding was partly due to the increased riverbed levels in the reach between Melling and Kennedy Good Bridges. A limited cross section survey of the lower reaches was carried out in February 2005 to determine changes in riverbed levels following the January flood.

In May 2005, the Landcare Committee considered the outcomes from the limited survey and increased the gravel extraction rates to 80,000 m<sup>3</sup>/year with the aim of lowering the bed levels in the lower reaches to 1998 levels (Report 05.166). 1998 bed levels were chosen as being suitable as they are a fixed reference point, and the mean bed levels are generally contained within the recommended minimum and maximum guidelines established in 2001. The gravel management policies including the extraction rates are now updated based on the 2008/09 survey data and a full technical report has been prepared.

## 4. Summary of Gravel Analysis Results

### 4.1 Riverbed Level Changes

Bed level changes are calculated by comparing the average bed level over the river channel at each cross section. Since the first full survey was carried out between 1987 and 1989, the river has a trend of aggrading on a whole downstream of Nash Street and degrading upstream of this point.

The 2004-2009 survey shows the change over point from aggradation to degradation is now just downstream of KGB (cross section 600) primarily due to extraction from here up to Nash Street.

**Attachment 1** shows the changes in bed level between 1998, 2004 and 2009 over the length of the river. On this graph, values above zero represent a bed level rise between 2004 and 2009, while values below zero show a drop in the bed level. Our bed level management policies aim to keep the Hutt River bed levels within an envelope of maximum and minimum bed levels. **Attachment 2** shows the 2004 and 2009 bed levels in relation to this envelope.

The graphs in **Attachments 1 & 2** show the general trend of the Hutt River bed levels; degradation in the upper reaches and aggradation in the lower reaches from Belmont to Ava. Gravel extraction in the reach from Belmont to Transpower substation has managed to lower the bed levels in this section of the reach but has not managed to cease aggradation downstream of this point.

The bed levels are generally greater than the maximum guidelines in the reach from Ava Railway Bridge to Belmont, and within or lower at several isolated points, upstream of Belmont. Therefore, in order to bring the bed levels within the recommended guidelines, gravel extraction will need to be continued in the current extraction reach and on the lower reaches (downstream of section 600) to the Ava Railway bridge. There is also an isolated increase in bed level at section 830 with a large gravel beach forming. It is recommended that some extraction be carried out in this area to reduce this area of aggradation.

Gravel extraction has succeeded in keeping the more frequent floods within the river channel.

The river channel is generally degrading upstream of Nash Street. The mean bed levels at Maoribank bend (2260 – 2310) have dropped by an average of 0.11 m during this period. This continued bed degradation could have some adverse impacts on the flood defence and other structures in the upper reaches.

Investigations have been conducted into the degradation at the Maoribank corner and a programme of works has been developed (report 09.141).

## 4.2 Gravel Volume Changes

The gravel volume at a cross-section is calculated as the change in volume between that section and the downstream section.

The total volume change over the length of river for the period 2004-2009 is a deposition of 108,807 m<sup>3</sup>. This is compared with deposition for the period surveyed of 1998 – 2004 of 219,800 m<sup>3</sup>. Table 1 shows details of where this gravel movement has occurred.

Table 1. Gravel Volume Changes

		Volume Change (m <sup>3</sup> )				
		1987-1993	1993-1998	1998-2004	2004-2009	1987-2009
<b>Mouth to Ava Railway Bridge</b>	<b>0030 - 0210</b>	8780	-18264	39029	30299	59843
<b>Ava Railway Bridge to Nash Street</b>	<b>0220 - 0930</b>	410378	-36576	231690	165070	784247
<b>Nash Street to Barton's Bush</b>	<b>0940 - 1580</b>	137515	-304867	-35060	-28665	-232657
<b>Barton's Bush to Memorial Park</b>	<b>1590 - 1710</b>	665709	-631711	-917	-3520	29561
<b>Memorial Park to Whakatiki River</b>	<b>1720 - 1920</b>	-17020	-34911	-6369	-2797	-61096
<b>Whakatiki River to Gibbons Street</b>	<b>1930 - 2040</b>	2785	-580	-18305	-16806	-32906
<b>Gibbons Street to Birchville Gorge</b>	<b>2050 - 2440</b>	-66227	-77796	-39541	-37514	-221078
<b>Birchville Gorge to the Hutt Gorge</b>	<b>2450 - 3050</b>	4408926	-4386570	49246	2741	80616
<b>Total</b>	<b>0030 - 3050</b>	<b>5550845</b>	<b>-5491274</b>	<b>219773</b>	<b>108807</b>	<b>406531</b>

## 4.3 Mouth and Harbour Survey

Between 40-50,000 m<sup>3</sup> per year of material has been extracted from the Hutt River mouth over the last 20+ years. The removal of this material aids in the free flow of flood waters exiting the Hutt River into the harbour. Hydrographic surveys were conducted in 1989, 1998, 2004 and 2009 with a partial survey conducted in 1993 in order to monitor the changes in bed level from the extraction works.

The surveys undertaken extend considerably beyond the mouth of the Hutt River and are showing an increase in levels of approximately 300mm. These areas of increase are however in deeper water (>3-4m) and considered to be far enough away from the mouth not to be a problem in the short to medium term.

Overall, gravel extraction at the mouth has managed to maintain the bed levels at a low enough depth to allow the free passage of flood waters. In comparison with 2004 levels however, general bed levels adjacent to the Mouth have risen

to some degree. However, the potential impacts from the gravel build up adjacent to the Waiwhetu Stream mouth needs to be further investigated and action taken to remove if necessary. The material in this area will need to be tested before it can be removed.

#### **4.4 Gravel Extraction**

Until 2005, gravel extraction was carried out under the global operations consent and was restricted to extraction from dry beaches. A separate wet extraction consent was obtained in 2006, following the 2005 flood, to extract from the wet areas of the river channel. (Consent No. WGN060334). This consent expires in 2011.

A total of 234,831 m<sup>3</sup> was extracted from the reach between the Ava Railway Bridge and just upstream of Kennedy Good Bridge from 2004 to 2009. Extraction at the mouth continued at a regular rate, with a total of 227,092 m<sup>3</sup> extracted since 2004. The river mouth extraction consent expires in 2011.

Gravel Balances

##### **4.4.1 Gravel Supply Rate KGB to Ewen.**

The gravel balance from Ewen Bridge (Section 290) to KGB gives a total deposition volume of 199,305m<sup>3</sup>, which corresponds to an annual supply rate to this reach of 39,861 m<sup>3</sup>/year.

Bed levels in the extraction reach are still well above the recommended 1998 bed levels. Roughly 143,000 m<sup>3</sup> of gravel needs to be removed in order to return the bed to 1998 levels. In order to remove this incoming gravel and lower the current bed levels to the 1998 levels over the next 5 years, an extraction rate of 70,000 m<sup>3</sup>/year is recommended for this reach. However, there have been difficulties in having this gravel removed because the industry are geared towards quarrying from the hills. This needs to be remedied if we are to achieve suitable bed levels within the next 5 years. Any increase in extraction rates should be closely monitored to avoid any adverse effects to the river channel. An extension to the current resource consent would be required.

## **5. Proposed Gravel Management Policies 2009-2014**

The following are the proposed gravel management policies for the Hutt River over the next five years:

1. That extraction continues from Ava Bridge to KGB to manage bed levels and maintain the capacity of the river channel. An extraction rate of an average of 70,000 m<sup>3</sup>/year is recommended, subject to ongoing monitoring, with an upper limit of 90,000 m<sup>3</sup>/ in any one year in order to lower bed levels to 1998 levels.
2. That dry extraction is carried out around section 830 to reduce the size of the gravel beach.
3. That an extension to the wet extraction consent to 2015 be sought.

4. That the gravel beaches upstream of Silverstream bridges, be actively managed by limited extraction and removal of vegetation on the dry beaches to reduce build up and encourage the gravel to move through the system during floods.
5. That the extraction rate of up to 50,000 m<sup>3</sup>/year at the Hutt River mouth be continued, and the possibility of removing the deposits below the Waiwhetu Stream mouth be investigated.
6. That an extension to the Hutt River mouth gravel extraction consent be sought.
7. That the regular 5-yearly cross-section surveys and gravel analyses continue as programmed.
8. That risks to structures in the upper reaches from the continued bed degradation be investigated.

## 6. Recommendations

*That the Subcommittee:*

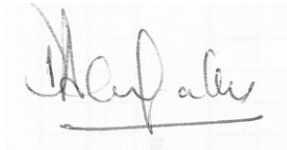
1. **Receives** this report and notes its contents.
2. **Endorses** the gravel management policies contained in Section 4 above.

Report prepared by:



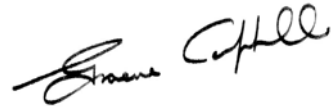
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Report approved by:



**Daya Atapattu**  
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**Graeme Campbell**  
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**Wayne O'Donnell**  
Divisional Manager,  
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**Attachment 1: Mean Bed Level Changes 1998-2009.**

**Attachment 2: Recommended Mean Bed Level Envelope with 2004 and 2009 Bed Levels.**