

## Chapter Three

# THE FIRST SCHEME Flood Control for the "lower" Hutt Valley

## 1900-1924

The first Hutt River Board was responsible for a number of small protective works and was successful in maintaining the security of the Fourth Hutt Bridge, built in 1872 and lasting 32 years (plate 24). It also constructed an embankment and breakwater in the Taita area (of unknown size and position) and provided grant assistance to a number of property owners to build their own minor works.

Although the Board consisted of capable local politicians, it was unable to come to grips with the major problem of widespread flooding. The reasons for its failure to promote effective flood control works are not easily identified. Contemporary accounts of local authority activities indicate that community commitment was often lacking, due to divergent objectives and insufficient financial resources. In 1883 the First Board went into abeyance, providing only minor grant assistance in 1885 before going into permanent recess in 1887.

The Second River Board enjoyed the full support of the residents of Lower Hutt Borough, being formed on 14 February 1899 at the end of a decade of phenomenal flooding. Quoting from the Hutt and Petone Chronicle of 22 June 1898:

*We do not for a moment suggest that a perfect remedy is at present possible, but what we are certain of is that a scheme of river conservation unselfishly pursued would make the Hutt Valley the garden of New Zealand. (from Once Upon a Village, David P Millar, p. 108)*

Not surprisingly Petone residents felt disinclined to contribute to the new authority, despite this call, and Petone continued to remain outside the rating district until 1940.

For the period 1900-1945 the Hutt River Board principally pursued the interests of Lower Hutt Borough and the river was effectively managed for the benefit of this community.

## The First Scheme of Works

In 1899 the Hutt River Board sought the assistance of the engineering partnership of Meason and Marchant to devise a scheme for the protection of Lower Hutt Borough. The firm was experienced in the design and construction of successful river control works for the Geraldine and Levels County Councils (South Island). Funds for stopbank construction were offered by private companies but the Board declined these offers in favour of raising an inscribed loan of £18,000.

Mr G Laing-Meason, a senior partner of Meason and Marchant, considered a number of options, including dredging the main channel and the construction of overflow banks and weirs, before recommending that the river be lined with embankments, complete with coffer dam work, concrete culverts and flap valves for land drainage.

*The approaches to the Hutt Bridge they thought should be faced with sheet piling. The then present bridge did not allow a maximum flood through, being far too low and as its condition was decidedly bad, they recommended the construction of a new and wider bridge. The estimate for the flood control work was £13,900 (\$ (1990) 1,600,000).*

*The next problem was money. A deputation went to (Prime Minister) Seddon to ask for financial help, claiming the cause of flooding lay with the felling of forests and the erection of bridges north of the River Board District. Seddon declined on the grounds that public money used on such a construction would result in the increase of land values, an increase from which only the Hutt would benefit. In this he was proved correct.*

*The Board proceeded to rate the district according to the liability of land to suffer flooding. The heaviest rate was to be paid by those with lands "liable to great actual damage", and a moderate rate by those with "lands indirectly liable to damage". The rates were levied to pay the interest on the loan of £18,000 the Board had been authorised to raise. (From *Once Upon A Village* David P Millar, pp. 109-110)*

Archive Table 6, p. 53, backgrounds the rating systems used by the Hutt River Board. Figure 11, p. 52, shows the changes to the rating district between 1900 and 1972, when rating was changed to a regional basis.

There was considerable opposition to the River Board and its proposals. The Ratepayers' Protective Association challenged the Board's validity in the Supreme Court, delaying the classification of the district. Legal action was also threatened by the Gear Meat Company, representing the concerns of the people of Petone. It was feared that the proposed eastern stopbank would result in higher flood levels rising against the Petone stopbank. Consideration was given to terminate the works at Whites Line with the banks returning to higher ground along this road. Proposals were also prepared for the stopbanks to follow their present alignment through Gear Island, but these were initially rejected as they increased the cost from £18,000 to £21,000. Only continued pressure and the threat of legal action from the Petone area led to the later (1906) construction of a new stopbank through Gear Island.

Once agreement on the scheme alignment had been reached delays were encountered with the replacement of the Fourth Bridge. Final agreement on the waterway and position of the Fifth Hutt Bridge led to local increases in stopbank height of 3 ft (900 mm) to allow for heading associated with the undersize waterway. Further details of the Scheme of Works are contained in Archive Table 5 below and in the following project reports contained in Part Two of this history.

**Project Report 1: Scheme for Conserving the Hutt River. 1900-1904.**  
Stopbanking works from the river mouth to Boulcott, on the eastern bank,  
and from the Petone Stopbank to Melling on the western bank.

**Project Report 2: Gear Island Stopbank. 1906.** Stopbank from Whites  
Line (west) to Waione Street along the eastern side of Gear Island.

### Scheme for Conserving the Hutt River

(Abbreviations refer to Archive Table 2, p. 7)

C1: 15 Jun 1899: HRBminutes

Meason and Marchant tender of £75 to survey (lower) Hutt River accepted. Leslie Reynolds' tender £131.5.0

C2: 20 Aug 1899: HRBminutes

Rate Payers Protective Assn challenged validity of HRB in Supreme Court. Classification of district (for rating) rescinded for second time as due process of tendering for a Classifier had not been followed. Royalty on river metal considered for the first time. Plans received from Meason and Marchant.

C3: 7 Nov 1899: HRBminutes

Arrangements made to survey land required for stopbank - preliminary to entering into negotiations for purchase.

C4: 14 Dec 1899: HRBminutes

Laing-Meason's scheme adopted. Plans and engineer's report circulated to all ratepayers. Meeting of ratepayers 21/12/99 approved scheme.

C5: 11 Jan 1900: HRBminutes

Mr Laing-Meason instructed to take measurement "at not less than three points, above the point of overflow" [undefined] to verify his estimate of the volume of water to be provided for in stopbank scheme. Deputation to government for new bridge.

C6: 8 Feb 1900: HRBminutes

Gear Meat hold HRB responsible for damage Gear Meat might sustain as a result of construction of new stopbank west of Gear Island.

C7: 8 Mar 1900: HRBminutes

Chairman again asks Laing-Meason to confirm that adequate provision has been made for protection south of "ridge" on Mudgeway's land and Gear Meat property in Section 10.

C8: 13 Mar 1900: HRBminutes

Meason and Marchant considered the Petone Stopbank high enough. Estimate that cost of works to protect Petone stopbank against erosion greater than £250. Laing-Meason to report on relocation of proposed stopbank alignment to east side of Gear Island rather than through Mudgeways - HRB think new alignment will silence opposition.

C9: 3 Apr 1900: HRBminutes

Report from Engineer on realignment at Gear Island. Motion to extend scheme to include this work at a total cost of £21,000 lost in favour of calling a poll for a loan of £18,000 to cover works with the western bank finishing at the Petone Stopbank (and to cover land purchase, compensation, and engineering fees).

C10: 7 Jun 1900: HRBminutes

Offers from various brokers in Wellington to provide loan monies. Declined in favour of an inscribed loan under the terms of the "Government Loans To Local Bodies Act". Meason and Marchant to proceed with detailed survey.

C11: 1 Aug 1900: HRBminutes

Option to terminate scheme at Whites Line - to avoid difficulty with land purchase - discussed.

C12: 8 Nov 1900: HRBminutes

PWD Engineer-in-Chief approves works.

C13: 17 Jan 1901: HRBminutes

Engineer recommends to raise stopbanks at the Hutt Bridge by 3 ft to allow for (hydraulic) choke. Recommends that new Hutt Bridge construction and stopbank construction be coordinated.

C14: 1901-03: HRBminutes

Construction of the Hutt River Board's first stopbanks under the 1899 "Scheme for Conserving the Hutt River". Stopbanks ran from Boulcott Golf Course to Seaview Road on the left bank, and from the Melling Bridge to the Ava Bridge on the right bank. (All place names in present day terms).

C15: 8 May 1902: HRBminutes

Observation recorded that the concrete wall north of the Hutt Bridge is constructed across an old pond.

C16: 30 Apr 1903: HRBminutes

Engineer's report on extension of District circulated to ratepayers.

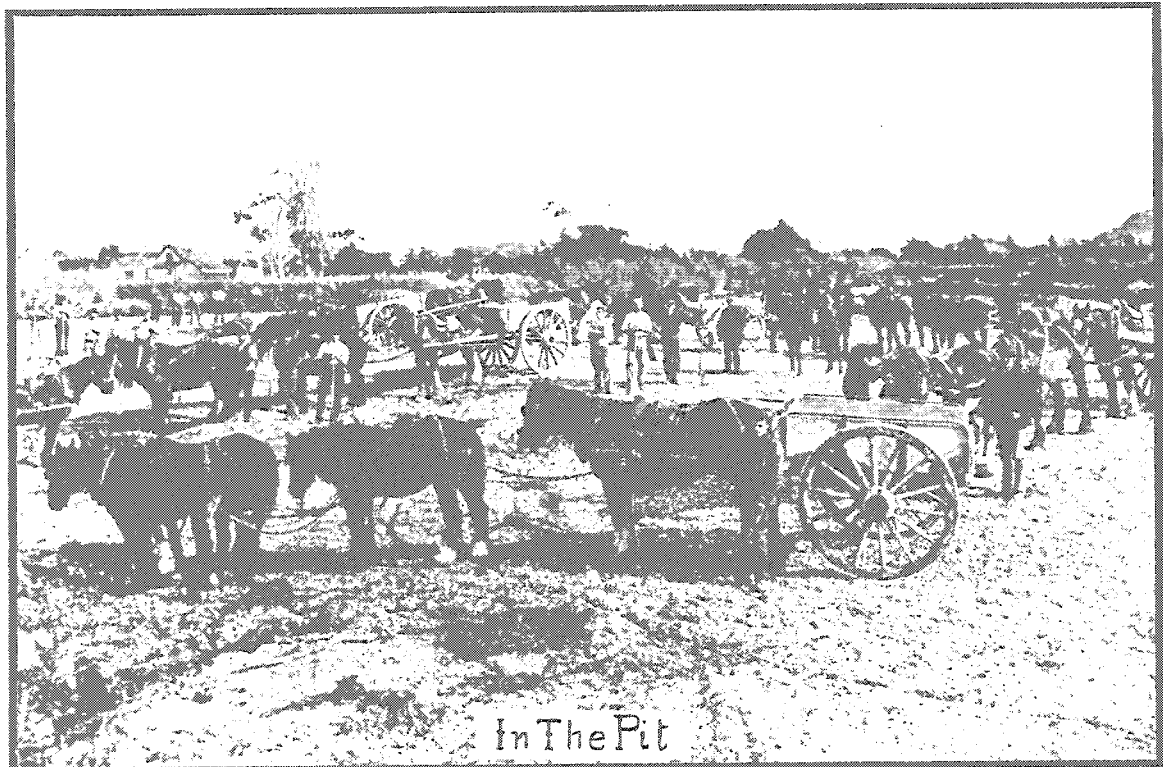
C17: 1906: HRBminutes

Extension (and completion) of stopbanking scheme from Ava Bridge to Jackson Street on the right (western) bank.

C18: 17 Jan 1907: HRBminutes

Cross sections supplied to Wellington City Engineer for use in design of the new Pipe Bridge (at the Estuary).

#### Archive Table 5: Scheme for Conserving the Hutt River 1899-1907

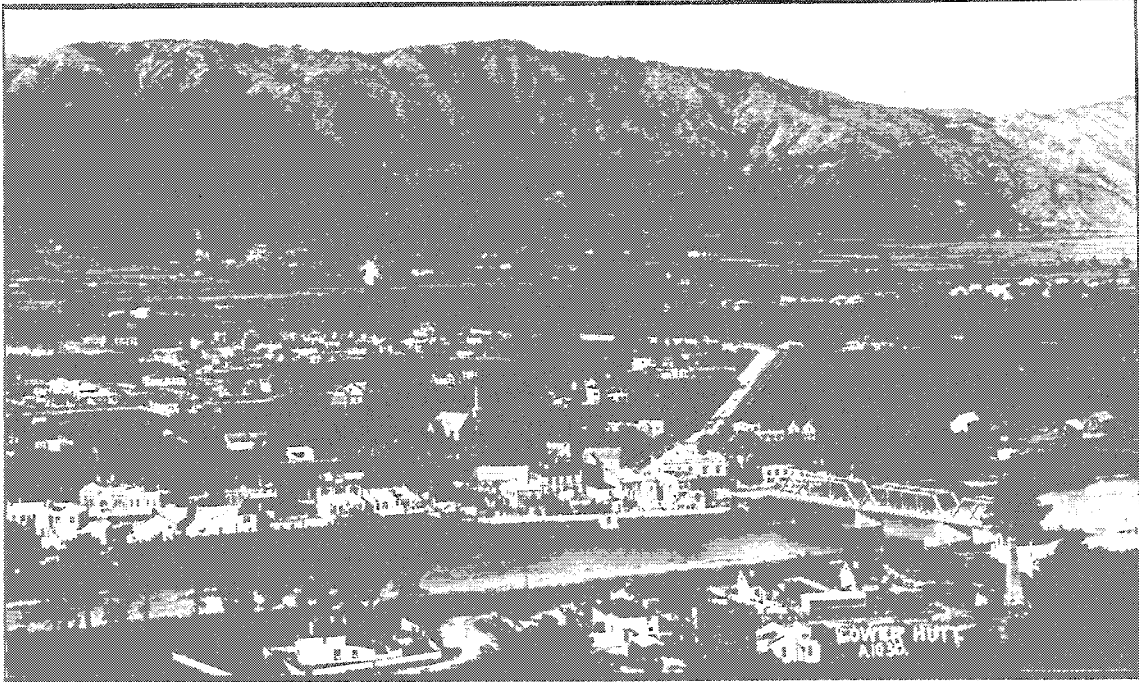


**Plate 28: Construction of the first stopbanks - the borrow pit.** Source: Alexander Turnbull Library, York studios, neg. F28348

Construction of the "Scheme for Conserving The Hutt River" 1901-1903. The stopbanks were constructed using shingle loaded by hand into half cubic yard trays (0.45 cu.m.) from selected river deposits. Compaction was achieved by directing the loaded drays along the embankments. The drays were unloaded using a steam powered crane and the shingle was spread by hand and horse drawn levelling bars. See also the Report rear cover for other photographs in this series.



**Plate 27: Construction of the first stopbanks - compaction.** Source: Alexander Turnbull Library, York Studios, neg. F28346



**Plate 29: Lower Hutt c. 1907**

Source: National Museum, neg. B16526

Plates 29 and 30 show the stopbanks not long after their construction. In Plate 29 notice the undeveloped Strand Park, and the Waiwhetu farmlands in the background. This low-lying area or "Third River" is recorded as taking overflows from the Taita area during the large floods of the 1800s. In plate 30 the dark line across Strand Park and Gear Island shows the position of the river in the 1870s.



**Plate 30: Lower Hutt c. 1920.**

Source: Alexander Turnbull Library, W.Thorley col., neg F70101

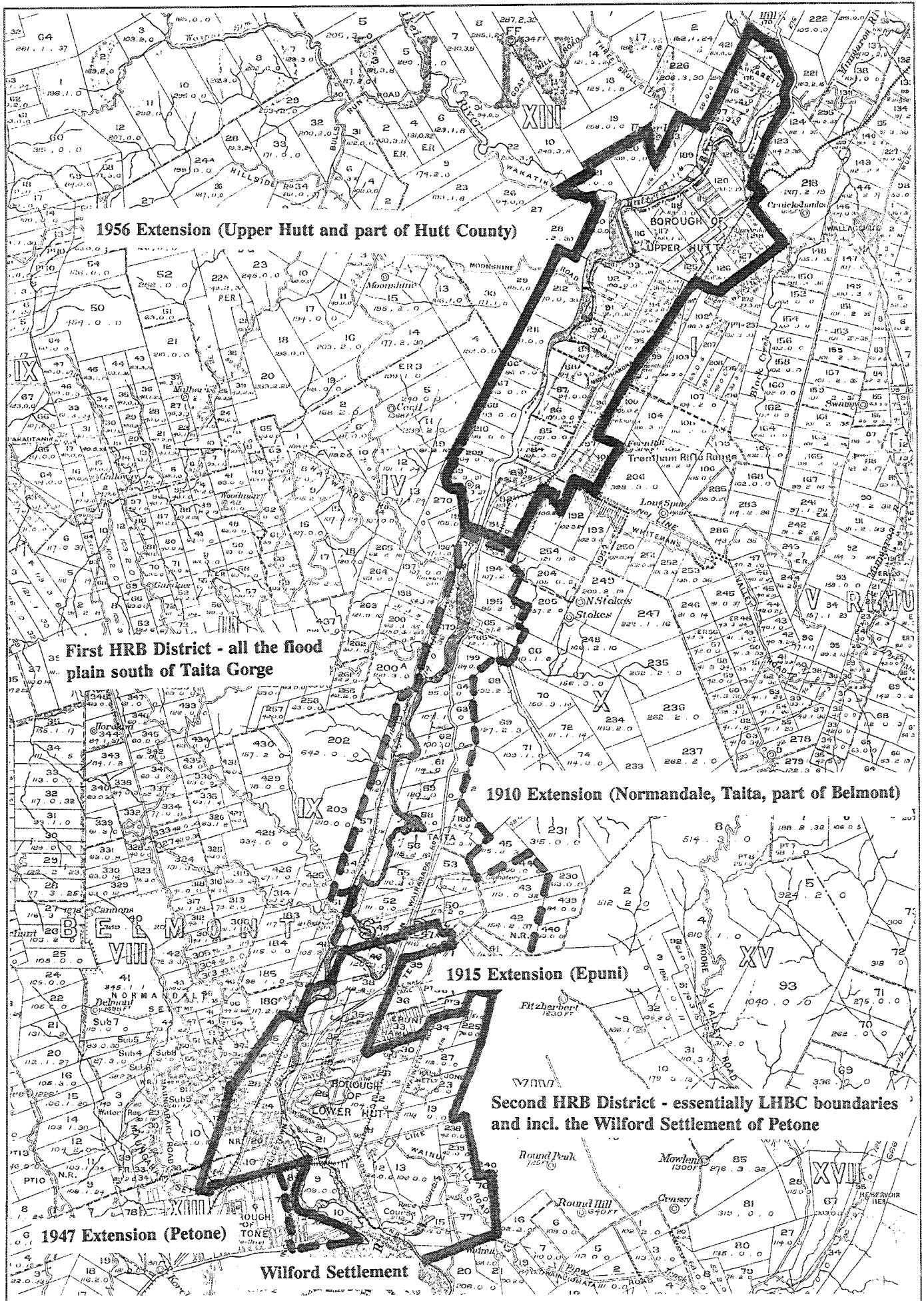


Figure 11: Hutt River District Boundaries. Source: 1954 Extension Proposals SSPHRB8

## THE HUTT RIVER BOARD DISTRICT

The first Hutt River Board was established in 1878 under the Rivers District Ordinance of the Wellington Provincial Council.

At the expiry of the Board's first term in office in 1885 the Board's affairs were effectively in abeyance through lack of ratepayer interest and support (population of Lower Hutt less than 1000). No election was held as the elected Board could continue in office and its operations continue under the provisions of the River Boards Act of 1884. The Board went into permanent recess in 1887.

The **First River District** included all the area to Silverstream with the exception of the hill sections of Normandale and Belmont and the areas adjacent to Epuni.

The **Second River District** was constituted on the 14 February 1899 and included only the Lower Hutt Borough, with the exception of the Normandale area and the area around Epuni. At this stage the northern Lower Hutt boundary with Hutt County crossed the valley near Park Road but did not include the Belmont area on the western side of the river, from about the present position of the Firth plant northwards.

As a result of a petition in 1910, the district was extended to include the Normandale area, the Taita area (including the gorge) and part of Belmont. In 1915 the River Board sought the inclusion of Epuni and Petone, however only Epuni was included at that time. Petone remained outside the area until a further, successful petition by the Board in 1947.

The Hutt River Board requested the Local Government Commission to order the extension of the district to include the upper valley in 1955 and an Order In Council to that effect was subsequently issued in March 1956. The extension was at the request of the Upper Hutt Borough Council and Hutt County Council, and allowed for a Board consisting of nine members; five representing the Lower Hutt subdivision, two representing the Petone subdivision and two, the Upper Hutt subdivision. Prior to this date the Board had consisted of six members; two from the Petone subdivision and four from the remainder of the River District.

## RATING/REVENUE

Until about 1921 the Hutt River Board rated under a classification system based on three classes of flood risk, derived essentially from an interpretation of contour information.

In about 1921 permission was given by the Minister of Internal Affairs, pursuant to provisions of section 9 of the River Boards Amendment Act 1913, to rate on a uniform scale without classification. In 1922 this rate was 3/20 of 1 penny per pound capital value.

By 1948 the general rate was 85/1000 of 1 penny per pound capital value, but by this time three additional classes of special rates were levied.

The additional rates were collected to reflect benefit from the 1950s scheme upgrading and were:

Class One 21/1000 of 1 penny per pound  
Class Two 14/1000 of 1 penny per pound  
Class Three 7/1000 of 1 penny per pound

Upon the inclusion of the upper valley into the district the Department of Internal Affairs was of the opinion that the Board were incorrectly relying on the 1921 proviso as a perpetual authority to levy rates. The Department considered that the rating approval should have been given annually. As a consequence the Board instructed its legal advisers to draft a local bill which was subsequently passed as the Hutt River Empowering Act, 1957 (Local No. 8). Section three of that Act authorised the Board to make and levy a special rate where a loan was raised for the benefit of part of the district; being a uniform rate on that part of the district benefitting. This rating process continued until the Hutt River Board functions were taken over by the Wellington Regional Water Board in 1973.

From 1973 funding for river works was obtained as part of the Water Board levy on the constituent Local Authorities. From 1980 funding has been from Wellington Regional Council general rating.

Substantial Government subsidies administered by the Soil Conservation and Rivers Control Council have been granted for Hutt River control works.

Government support for river control works commenced in 1956 with 50 percent subsidies on the Major Scheme works in Lower and Upper Hutt. Subsidies of from 30-66 percent were given for various parts of the scheme. Government support also extended to the general area of catchment resources management, and is continuing for flood plain management studies. Since 1986 subsidy support for new works has been gradually phased out as it is directly linked to the size of a Region's rating base which, for the Hutt Valley, is large by New Zealand standards.

## Commissioning of the First Scheme

The construction of the stopbanks defined for the first time a River Zone. The Hutt River Board of Conservators now had to face the real challenge of containing the river within this zone, a challenge which they failed to meet, leading to the resignation of the Board's chairmen in 1912, 1920 and 1923.

From early engineering correspondence it is clear that Board members did not appreciate the consequences of confining a large, steep river. Although their Engineer called for a scheme of river management, their experience related principally to flooding - now presumably solved by the stopbanks. They had no call to closely observe the processes of bed erosion and deposition, and there is no record of discussion of the major problems to be anticipated following the confinement of the flood flows. Some of the members must have been aware of the power of the river to erode large areas of land overnight, but they appear to have remained silent.

Although the Hutt River had a history of widespread flooding, its course was relatively stable - it was not a wide braided river subject to wild fluctuations. The stability was almost certainly due to the relief provided by the Boulcott and Taita overflow channels. As flood volumes increased, water spilled across the plains into the "Second" (Okoutu) and "Third" (Waiwhetu) rivers. This reduced the flood flows in the central channel, reduced flood levels and the depth of flood flows.

The direct consequence of closing the overflow routes was to significantly change the scour and deposition processes within the central channel. Flood flow velocities and depths were increased by up to 50 percent; in terms of bed load transport, increasing the potential to scour and redeposit bed material by perhaps 300 to 500 percent.

The first 20 years of river management involved much trial and error, and effective management techniques for the development and control of the central channel were not established until 1924. A further 20 years of experimentation were required before the channel in the lower valley approximated a satisfactory alignment. During this period maintenance expenditure reached almost 10 times the cost of the original capital works.

Tables I and II, "River Works Expenditure 1907-1990", p. 58, have been prepared from the Hutt River Board Statement of Accounts to illustrate the expenditure required to establish the initial scheme works, and later to extend and upgrade the scheme. The level of debt carried by 1921 is indicative of the problems encountered during the early years.

## River Management 1900-1924

1900 to 1924 were formative years for the Hutt River Board. The construction and commissioning of the first scheme of works developed the policies and practices which the Board followed until its demise in 1972. The initial heavy burden of debt accrued in the first two decades also left a lasting conservatism, reflected in the cautious attitude taken towards the extension of the Scheme in the 1950s.



River alignment works, the development of Gear Island, the establishment of a river extraction industry, and the removal of forest debris were the major projects to occupy the Board. A summary of the river works undertaken during the 1900-1924 period is contained in Archive Table 7, Rivers Control 1900-1924, p. 59. These included the construction of heavy timber groynes, railway iron breastwork, boulder filled netting weirs and groynes, and the establishment of willow plantations. Most of the works were constructed to Laing-Meason's 1902 specification for the scheme of management and to his specifications for additional works required after the large floods of 1913 and 1915. Examples of this work are still in evidence in the lower river.

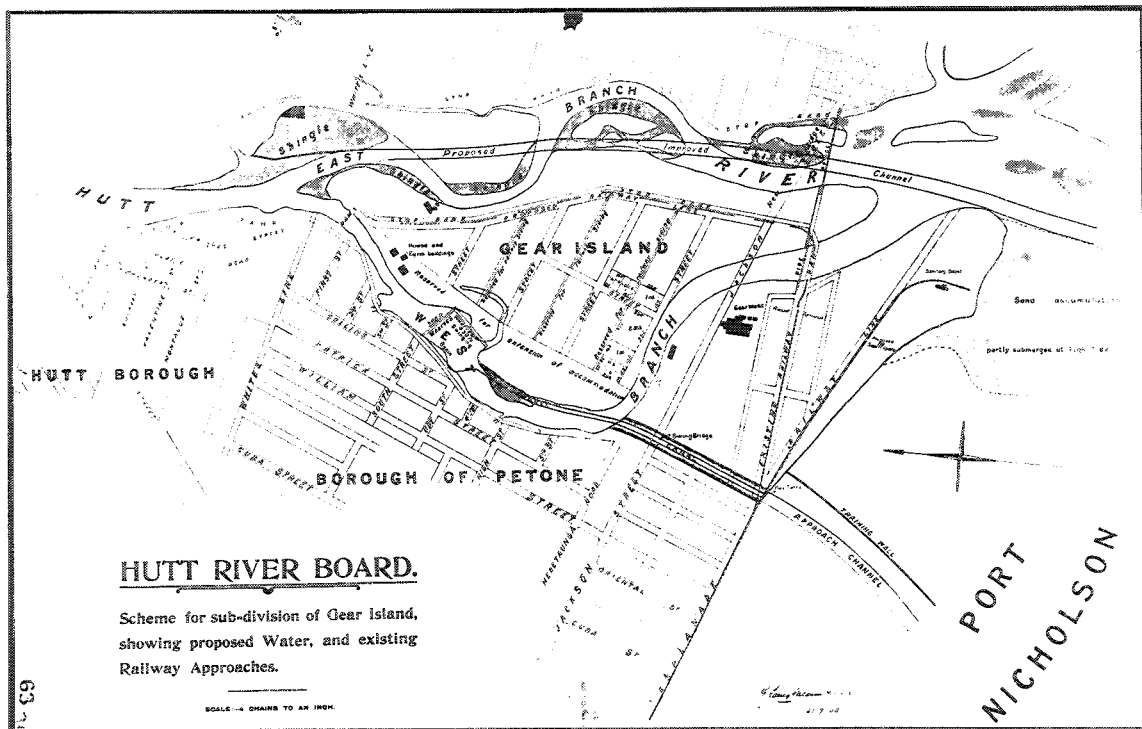
It is only possible to guess at the scope of much of this work. The period 1900-1924 is poorly recorded, the only source of information being the Hutt River Board Minute Papers. The few detailed engineering files that have been retained are those of Laing-Meason's successor, Hubert Sladden of the Seaton, Sladden and Pavitt partnership. Although these do not start until 1924, limited references to the 1900-1924 period and some original documents are included. These references can be assumed to be accurate as H Sladden was an engineering cadet with Laing-Meason. Sladden had also been appointed as stand-in during Laing-Meason's illness before the Engineer's death in 1924 and was appointed as Engineer shortly thereafter.

The full extent of ongoing management services provided by Laing-Meason are not recorded, although the Hutt River Board Minute papers of 6 November 1902 note that he was required to formulate a scheme for the maintenance of the works. His report apparently included recommendations for the River District to be extended from the Borough boundary to the Taita Gorge. This illustrates his appreciation of the need to manage the overall river alignment and shingle resource, and of the continuing threat posed to Lower Hutt Borough by the Taita and Pomare overflows.

From 1899 to 1911 Laing-Meason was in regular attendance at the Board meetings and was presumably responsible for the management and maintenance of the scheme. Political changes between 1911 and 1912 led the Board to dispense with the services of the Engineer and Solicitor, with Board members taking over the direct operation of the Scheme. The changes in Board membership resulted in the resignation of the Chairman in May 1912, along with a disclaimer of responsibility from Laing-Meason. Laing-Meason continued to be requested to provide advice on specific issues but was not involved in the general operation or development of the Scheme. In 1922 Laing-Meason once again became a regular advisor following a further change in Board membership, and the failure of the Board's dredging enterprise (refer chapter 4).

The other major projects to occupy the Board prior to 1924 were development of Gear Island, establishment of a river shingle extraction industry, and removal of forest debris.

The "delogging" of the river, as the removal of the forest debris was termed, was an ongoing operation which lasted well into the 1930s. Throughout the latter half of the 19th century settlers had used the river as a dumping ground for unwanted forest clearance waste. By the turn of the century the bed was littered with large logs buried within the vast accumulation of shingle and erosion deposits. Many of the logs were large enough to divert the central channel flow and to trigger the deposition of flood borne debris. With each large flood the logs, silt, and shingle were repositioned and the



**Plate 31: Gear Island Proposals 1913**

Source: Wellington Maritime Museum neg. 6623

central channel alignment altered. To achieve Laing-Meason's "Ultimate Channel Alignment", the central feature of the 1902 Scheme of Management, it was necessary to remove the forest debris. Delogging the river was a major item of Board expenditure throughout the first 20 years, and continued with the removal of the fossilized forest remnants that were exposed as the bed levels dropped and the river cut into the deposits laid down during the post-glacial period.

The establishment of the shingle industry marked the turning point in the development of a controllable central channel alignment. The shingle business is the major concern recorded in the Board Minutes for the 1910-1920 period as the Board struggled to control the moving shingle deposits. Thereafter the business provided the bulk of the Board's income until the involvement of central Government in the 1940s. A discussion of the development of the shingle extraction industry is the subject of chapter 4. The business was pivotal to the establishment of the central channel alignment and to the fortunes of the Hutt River Board and the residents of the Lower Valley.

For an account of the debate which followed the development of Gear Island the reader is referred to *Petone: A History* by Susan Butterworth. Plate 31 shows one Hutt River Board scheme for the area. The Board investigated the development of a Hutt Valley port on a number of occasions in an attempt to stimulate growth in the Hutt Valley and to earn revenue. The proposals were abandoned at each attempt as the anticipated trade volumes could not support the capital outlay.

**Tables I and II : River Works Expenditure 1907-1990**

| Year<br>to 31/3/**  | Total An.<br>Expend.      | Works &<br>Maint.   | Loan<br>Works | Rates<br>Income             | Value of<br>Assets       | Value of<br>land                        | Public Debt                      | Consumer<br>Price Index | Const.<br>Cost<br>Index |
|---|---------------------------|---------------------|---------------|-----------------------------|--------------------------|---|----------------------------------|-------------------------|-------------------------|
|   | Works, Invest.<br>& Admin | Works on<br>Revenue | Works on Loan | River rates HRB<br>district | Nett total incl.<br>land | Land holdings                           | Value of<br>outstanding<br>loans |                         |                         |
| All Values expressed as Pounds Sterling   |                           |                     |               |                             |                          |   |                                  |                         |                         |
| 1907  | 4974                      | 670                 | 3800          | 500                         | -3860                    | 5611                                    | 35,712                           | 235                     |                         |
| Public debt comprised 18,000 for the original scheme works, 1,800 as 10% additional thereto, followed by 15,000 + 1,500 for extension of the works within the district, for compensation, for land purchase, and for the construction of initial protection and training works.   |                           |                     |               |                             |                          |   |                                  |                         |                         |
| 1908  | 5946                      | 1040                | 4350          | 718                         | -2054                    | 5611                                    | 40,872                           | 235                     |                         |
| 1909  | 2975                      | 1175                | 1232          | 543                         | 1584                     | 5766                                    | 46,035                           | 232                     |                         |
| Loan of 10,000 raised for additional costs relating to the initial scheme works.  |                           |                     |               |                             |                          |   |                                  |                         |                         |
| 1910  | 2326                      | 722                 | 1045          | 733                         | 1924                     | 6688                                    | 47,563                           | 234                     |                         |
| 1911  | 1708                      | 700                 | 450           | 520                         | 1796                     | 6688                                    | 47,563                           | 233                     |                         |
| 1912  | 1898                      | 780                 | 600           | 503                         | 1320                     | 6688                                    | 47,563                           | 240                     |                         |
| 1913  | 2282                      | 1760                | 31            | 459                         | 925                      | 6288                                    | 47,563                           | 245                     |                         |
| 1914  | 2214                      | 844                 | 871           | 511                         | 976                      | 6288                                    | 48,587                           | 252                     |                         |
| Loan of 1,000 to cover expenditure on repairs and training works required after the 1913 flood (but not built until after the 1915 flood).  |                           |                     |               |                             |                          |   |                                  |                         |                         |
| 1915  | 1896                      | 1232                | 137           | 630                         | 507                      | 6288                                    | 48,587                           | 271                     |                         |
| 1916  | 2658                      | 800                 | 1324          | 532                         | -245                     | 6288                                    | 48,587                           | 291                     |                         |
| 1917  | 1949                      | 573                 | 613           | 534                         | 2355                     | 6288                                    | 51,587                           | 315                     |                         |
| 1918  | 2622                      | 683                 | 1358          | 497                         | 2977                     | 6288                                    | 53,587                           | 341                     |                         |
| Loan of 5,000 to cover expenditure on repairs and training works required after the 1915 flood.   |                           |                     |               |                             |                          |   |                                  |                         |                         |
| 1919  | 1679                      | 974                 | 127           | 568                         | 2421                     | 6288                                    | 53,587                           | 366                     |                         |
| 1920  | 2082                      | 1050                | 188           | 581                         | 1479                     | 6288                                    | 53,587                           | 409                     |                         |
| 1921  | 6552                      | 971                 | 4500          | 516                         | 6218                     | 6288                                    | 62,587                           | 415                     |                         |
| Loan of 9,000 to cover the establishment of the shingle dredging operation - dredge, machinery, crusher and commissioning. Started operation in 1922. Costs and revenue were contained in the general account. The profit from the shingle business made up the difference between annual expenditure and income (rates & loans). |                           |                     |               |                             |                          |   |                                  |                         |                         |
| 1922  | 8914                      | 2035                | 3300          | 1049                        | 6705                     | 6563                                    | 62,587                           | 382                     |                         |
| 1923  | 9168                      | 3656                |               | 792                         | 6481                     | 6573                                    | 62,587                           | 385                     |                         |
| 1924  | 8388                      | 2656                |               | 690                         | 4812                     | 7188                                    | 62,587                           | 395                     |                         |
| 1925  | 5755                      | 2985                |               | 693                         | 5251                     | 7378<br>(revaluation of<br>Gear Island) | 62,587                           | 403                     |                         |
| 1926  | 4911                      | 1900                |               | 832                         | 5949                     | 21,160                                  | 62,587                           | 405                     |                         |
| 1927  | 6080                      | 2700                |               | 945                         | 5301                     | 21,930                                  | 62,587                           | 402                     |                         |
| 1928  | 5087                      | 1000                |               | 1130                        | 6509                     | 22,200                                  | 62,587                           | 404                     |                         |
| 1929  | 6546                      | 2950                |               | 1417                        | 4350                     | 23,595<br>(purchase<br>Waiwhetu Pa)     | 62,587                           | 403                     |                         |
| 1930  | 7368                      | 3235                |               | 2825                        | 4787                     | 24,270                                  | 62,587                           | 394                     |                         |
| Liability for the original scheme loans cease, stopbank raising (unemployment relief work) and 1931 flood damage repairs, 1931 - 1945.  |                           |                     |               |                             |                          |   |                                  |                         |                         |
| 1931  | 5796                      | 2372                |               | 2704                        | 7348                     | 24,495                                  | 57,434                           | 364                     |                         |
| 1932  | 7226                      | 3459                | 850           | 2618                        | 6773                     | 24,445                                  | 52,277                           | 336                     |                         |
| 1933  | 5835                      | 1886                | 1721          | 2628                        | 7907                     | 24,445                                  | 47,131                           | 319                     |                         |
| 1934  | 5089                      | 2172                | 737           | 2881                        | 9019                     | 24,445                                  | 41,972                           | 324                     |                         |
| 1935  | 4898                      | 2119                | 520           | 3413                        | 10,202                   | 24,645                                  | 30,330                           | 336                     |                         |
| 1936  | 5668                      | 2825                | 298           | 3383                        | 10,913                   | 22,705                                  | 30,330                           | 347                     |                         |
| 1937  | 6570                      | 2947                | 200           | 3420                        | 9310                     | 22,705                                  | 28,283                           | 370                     |                         |
| 1938  | 7117                      | 2679                | 748           | 2530                        | 7818                     | 22,705                                  | 28,007                           | 382                     |                         |
| 1939  | 5909                      | 3070                | 845           | 2807                        | 9560                     | 22,705                                  | 27,718                           | 397                     |                         |
| 1940  | 6651                      | 3284                | 168           | 2587                        | 10,630                   | 22,905                                  | 26,393                           | 415                     |                         |
| 1941  | 5664                      | 2969                |               | 2016                        | 10,010                   | 22,905                                  | 26,079                           | 431                     |                         |
| 1942  | 7664                      | 4570                |               | 2367                        | 9967                     | 22,355                                  | 20,745                           | 445                     |                         |
| 1943  | 5949                      | 3319                |               | 2966                        | 11,009                   | 22,330                                  | 15,258                           | 455                     |                         |
| 1944  | 5979                      | 2948                |               | 2964                        | 13,424                   | 22,330                                  | 9752                             | 464                     |                         |
| 1945  | 6971                      | 3180                |               | 3053                        | 14,779                   | 23,080                                  | 4427                             | 470                     |                         |
| 1946  | 6311                      | 2901                |               | 3227                        | 17,528                   | 23,080                                  | 4039                             | 474                     | 100                     |

### Tables I and II : River Works Expenditure 1907-1990

| Year   | Total An. Expend.      | Works & Maint.   | Loan Works    | Rates Income             | Value of Assets       | Value of land | Public Debt                | Consumer Price Index | Const. Cost Index |
|--|------------------------|------------------|---------------|--------------------------|-----------------------|---------------|----------------------------|----------------------|-------------------|
| to 31/3/**   | Works, Invest. & Admin | Works on Revenue | Works on Loan | River rates HRB district | Nett total incl. land | Land holdings | Value of outstanding loans |                      |                   |
| 1947   | 7515                   | 4633             |               | 3386                     | 19,333                | 23,080        | 3636                       | 488                  | 102               |
| 1948   | 12,839                 | 8327             |               | 4287                     | 17,019                | 23,080        | 3214                       | 527                  | 110               |
| Extensive bulldozing in the Fraser Park / Mabey Road areas following the June 1947 flood and the May 1948 flood.   |                        |                  |               |                          |                       |               |                            |                      |                   |
| 1949   | 13,035                 | 8000             |               |                          | 14,369                | 23,080        | (2500)                     | 536                  | 112               |
| 1950   | 10,019                 | 5203             |               | 8962                     | 21,858                | 23,080        | 2317                       | 566                  | 120               |
| 1951   | 13,263                 | 5193             |               | 9473                     | 24,978                | 23,080        | 1839                       | 629                  | 141               |
| 1952   | 14,048                 | 6312             |               | 9254                     | 78,992                | 21,695        | 1341                       | 678                  | 150               |
| 1952 Sale of river land (previously not valued as an asset) to the Crown. 1954 Edmond Creek diversion. From 1956 includes work carried out in Upper Hutt.  |                        |                  |               |                          |                       |               |                            |                      |                   |
| 1953   | 15,349                 | 6792             |               | 9832                     | 85,543                | 21,605        | 821                        | 709                  | 160               |
| 1954   | 29,660                 | 7391             |               | 9842                     | 80,057                | 27,534        |                            | 741                  | 167               |
| 1955   | 24,437                 | 7945             | 1268          | 10,472                   | 87,073                | 29,198        |                            | 760                  | 172               |
| 1956   | 33,399                 | 18,380           | 4682          | 10,465                   | 83,507                | 29,189        |                            | 786                  | 180               |
| 1957   | 79,797                 | 11,080           | 48,281        | 14,769                   | 56,838                | 62,745        |                            | 803                  | 186               |
| 1958   | 52,295                 | 11,500           | 18,000        | 21,157                   | 61,609                | 63,320        |                            | 839                  | 191               |
| 1959   | 51,466                 | 21,000           | 4095          | 20,581                   | 74,544                | 63,320        |                            | 871                  | 199               |
| 1960   | 73,841                 | 21,464           |               | 19,417                   | 69,236                | 98,825        |                            | 877                  | 208               |
| 1961   | 78,027                 | 53,607           |               | 19,937                   | 69,421                | 105,030       |                            | 893                  | 215               |
| 1962   | 67959                  | 45,841           |               | 22,225                   | 75,337                | 104,670       |                            | 916                  | 220               |
| 1963   | 79,194                 | 21,798           |               | 22,254                   | 75,337                | 124,090       |                            | 935                  | 223               |
| 1964   | 41,288                 | 16,827           | 1800          | 24,318                   | 189,115               | 124,940       |                            | 967                  | 229               |
| 1965   | 146,082                | 38,446           | 87,807        | 25,844                   | 171,087               | 130,705       |                            | 1000                 | 245               |
| 1966   | 100,268                | 46,811           | 22,117        | 24,913                   | 165,020               | 145,465       |                            |                      | 253               |
| 1967   | 167,099                | 71,604           | 58,802        | 23,809                   | 93,581                | 165,695       |                            |                      | 265               |
| Remaining values all expressed in terms of decimal currency. Make allowance when undertaking CPI / CCI adjustments.  |                        |                  |               |                          |                       |               |                            |                      |                   |
| 1968   | 280,947                | 112,726          | 69,821        | 52,110                   | 158,782               | 352,590       |                            |                      | 270               |
| 1969   | 184,193                | 58,649           | 67,751        | 68,228                   | 197,120               | 456,870       | 89,000                     |                      | 295               |
| 1970   | 213,820                | 95,260           | 70,439        | 67,640                   | 221,763               | 454,870       | 87,000                     |                      | 317               |
| 1971   | 231,849                | 83,721           | 73,681        | 63,477                   | 224,046               | 454,870       | 86,000                     |                      | 375               |
| 1972   | 181,322                | 124,702          |               | 78,262                   | 175,432               | 452,700       | 83,000                     |                      | 412               |
| 1973   | 229,483                | 147,798          |               | 55,829                   | 136,355               | 625,250       | 81,000                     |                      | 436               |
| In 1973 the functions of the Hutt River Board were incorporated into the Wellington Regional Water Board, and in 1984, the Wellington Regional Council functions. Rates and assets were amalgamated and cannot be simply related to the HRFCS. |                        |                  |               |                          |                       |               |                            |                      |                   |
| 1974   | 152,782                | 133,000          |               |                          |                       |               | 79,000                     |                      | 484               |
| 1975   | 243,694                | 130,000          |               |                          |                       |               | 77,000                     |                      | 587               |
| 1976   | 284,174                | 79,000           |               |                          |                       |               | 75,000                     |                      | 720               |
| 1977   | 256,926                | 51,000           |               |                          |                       |               | 71,000                     |                      | 824               |
| 1978   | (200,000)              | 68,000           |               |                          |                       |               | 69,000                     |                      | 927               |
| 1979   | 154,534                | 55,600           |               |                          |                       |               | 66,000                     |                      | 1027              |
| 1980   | 184,388                | 89,600           |               |                          |                       |               | 63,000                     |                      | 1318              |
| 1981   | 275,524                | 80,900           |               |                          |                       |               | 60,000                     |                      | 1590              |
| 1982   | 322,834                | 112,500          | 13,000        |                          |                       |               | 56,000                     |                      | 1870              |
| 1983   | 587,474                | 161,250          |               |                          |                       |               | 53,000                     |                      | 2010              |
| 1984   | 866,043                | 449,500          | 153,500       |                          |                       |               | 48,000                     |                      | 2040              |
| 1985   | 1,037,555              | 425,200          | 36,400        |                          |                       |               | 44,000                     |                      | 2320              |
| 1986   | 1,270,446              | 485,200          |               |                          |                       |               | 40,000                     |                      | 2630              |
| 1987   | 1,513,336              | 493,800          | 107,900       |                          |                       |               | 35,000                     |                      | 2770              |
| 1988   | 1,401,939              | 628,200          | 34,700        |                          |                       |               | 231,000                    |                      | 2980              |
| 1989   | 2,194,500              | 903,000          | 132,500       |                          |                       |               | 1,872,000                  |                      | 3120              |
| 1990   |                        | 1,923,900        | 882,200       |                          |                       |               | 4,366,000                  |                      | 3270              |

## Rivers Control 1900-1924

(Abbreviations refer to Archive Table 2, p. 7)

B9: 6 Sep 1900: HRBminutes  
Purchase of 35 ton of rail from NZR for protective works.

B10: 6 Nov 1902: HRBminutes  
Engineer to formulate a scheme for the maintenance of the river. His recommendations included "best means of removing shingle from the bed of the river". Also recommended extension of the Board's District to Taita Gorge.

B11: 1900-1920: Various  
General references to log removal operations in the lower channel.

B12: Jan 1905: HRBminutes : position not known  
HRB desires to proceed with works at Taita. HCC agreed Feb 1905 and works constructed at day rates under Engineer's supervision.

B13: Sep 1905: HRBminutes  
Mr Welch complained that the embankment at Taita was causing ponding on his property. Marchant (Meason's partner) inspected the embankment and observed that it was of no value in stopping overflow as placed. Foreman to lay 18" pipe through bank.

Meason's comments to HRB:

- (1) At the time the embankment constructed the river much higher than at present.
- (2) Evidence of comparatively recent overflow.
- (3) Pipes were intended but accidentally omitted.

B14: Oct 1905: HRBminutes : 140  
Foreman to effect any necessary repairs to Jorgensen's embankment and to use the heaviest netting available.

B15: 7 Feb 1907: HRBminutes  
Diversion cuts through Riddiford's land (260-300) opposite Alicetown and through Board property at Gear Island (170-200) - value £242

B16: Oct 1909: HRBminutes  
6 additional boom groynes built, 66 x 30' turpentine poles purchased.

B17: 6 Mar 1910: HRBminutes  
Re extension of scheme: time taken to obtain necessary ratepayers' signatures excessive and the matter deferred until Act of Parliament changes requirements.

B18: Jul 1910: HRBminutes  
Encroachment of river onto Welch and Hewe's properties at Taita (just upstream of the Taita Hotel). Something would have to be done to prevent loss of land and flooding of Lower Hutt. Referred to Engineer. HRB to pay share of works built by HCC under direction of Engineer after inclusion of HCC into district. HRB refuse to do work in Belmont - outside district.

B19: 8 Dec 1910: HRBminutes  
Delogging of river - logs to be cut into sections and sold as firewood.

D20: 19 Jan 1911 to Mar 1912: HRBminutes  
River control passes from Engineer directly to Board. In Jan 1911 Engineer and Solicitor instructed not to attend Board meetings. On 2 May Dilnot Sladden (chairman) resigns.

B21: 14 Mar 1912: HRBminutes  
Groyne at Melling Bridge. Boulder sills at Masons (720). Channel cut at Pitcaithley's shingle works - Taita area (880).

B22: 6 Jun 1912: HRBminutes  
Boom groynes constructed downstream of Silverstream Bridge. Cut through spit at Stokes Valley opposite damaged road (1150-1170).

B23: 12 Sep 1912: HRBminutes: 850  
Protective works on Native Land, Taita.

B24: Aug 1914: HRBminutes  
Engineer's report on river works from Hutt Bridge to the sea (after 1913 flood) required works of £2840. Additional work of £1680 proposed by overseer. Board resolves to raise loan.

B25: 7 May 1919: HRBminutes  
Pampas grass and bamboo considered for protective works.

B26: 12 Oct 1921: HRBminutes  
Truebridge to survey from Main Bridge to Silverstream for £80 and from Main Bridge to the sea for same rate per mile.

B27: Feb 1922: HRBminutes  
Engineer's report for work for the next 5 years. Groynes 16/- per foot, reducing to 9/- per foot if birch walings used. A tender for £4.15.5 per bay being accepted.

B28: Apr 1922: HRBminutes  
Diversion cut at Seagars.

B29: Jun 1922: HRBminutes  
Estuary reclamation and river improvement scheme approved by Minister. Hutt River Improvement and Reclamation Bill passed 1922

B30: 31 Aug 1922: SSPHRB6  
Contract for construction of open boom groynes 152 bays in 27 locations (27 groynes) along both banks of the river for 3.5 miles upstream of the Hutt Bridge as shown on plan series 1.

B31: Jan 1923: HRBminutes: 740  
Iron breastwork at Belmont proceeded with - value £275.

B32: May 1923: HRBminutes: 730  
Boulder groynes behind Masons Gardens - value £175.

B33: 21 Nov 1923: HRBminutes  
During Laing-Meason's illness Sladden appointed temporarily as Engineer. April 1924 Laing-Meason attending to Board matters. 14 May 1924 Laing-Meason dies. July 1924 Sladden appointed as Engineer.

## Flooding 1900-1924 : The First Scheme Trials

Records of flooding in this period are scarce. From 1904 it was the overseer's responsibility to record flood levels in his day book (at predetermined locations). As with most Hutt River Board records, these have been misplaced. The floods of 1904, 1907, 1911, 1912, 1913 and 1915 are referred to in the Board Minute Papers. Engineering comment was included in separate Engineer's reports that are now no longer attached to the minute papers. It is therefore necessary to rely on the general comments included in the minutes.

The March 1907 flood is described as "heavy" and caused damage to the Pipe Bridge, and erosion at Mason's Gardens, Taita. The only record of the 1904 flood is the photograph of High Street after the event, plate 25, p. 44.

Floods occurred on 13 April 1909 and 6 April 1911 and in July 1911. Laing-Meason considered it imperative that he inspect the river after the July 1911 flood, indicating that it must have been a significant event. The Board declined his services and Laing-Meason disclaimed responsibility for subsequent damage.

In December 1912 the overseer was required to proceed with protection works following a November 1912 flood and in May 1913 the chairman took personal responsibility for reporting the flood. Again the best record is the photograph of the flood, plate 32, below.

Following the 1913 flood Laing-Meason was employed to report on river works from the Hutt Bridge to the sea (refer WRC plan HR2040). These were not constructed until after a larger flood occurred in July 1915, described later by H Sladden as being computed at 45,550 cusecs (1286 cumecs). Interestingly Sladden described the 1915 flood as the largest known to that time.

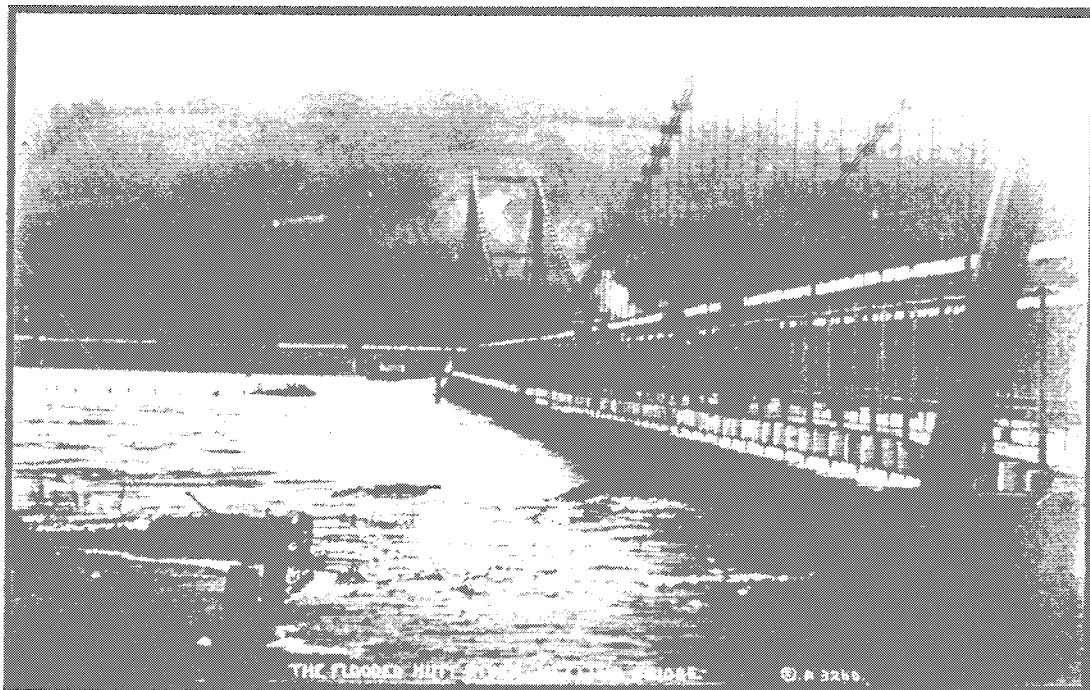


Plate 32: 1913 Flood viewed from Melling Suspension Bridge. Note the freeboard to the train in the background. Source: Hutt City Memorial Library.

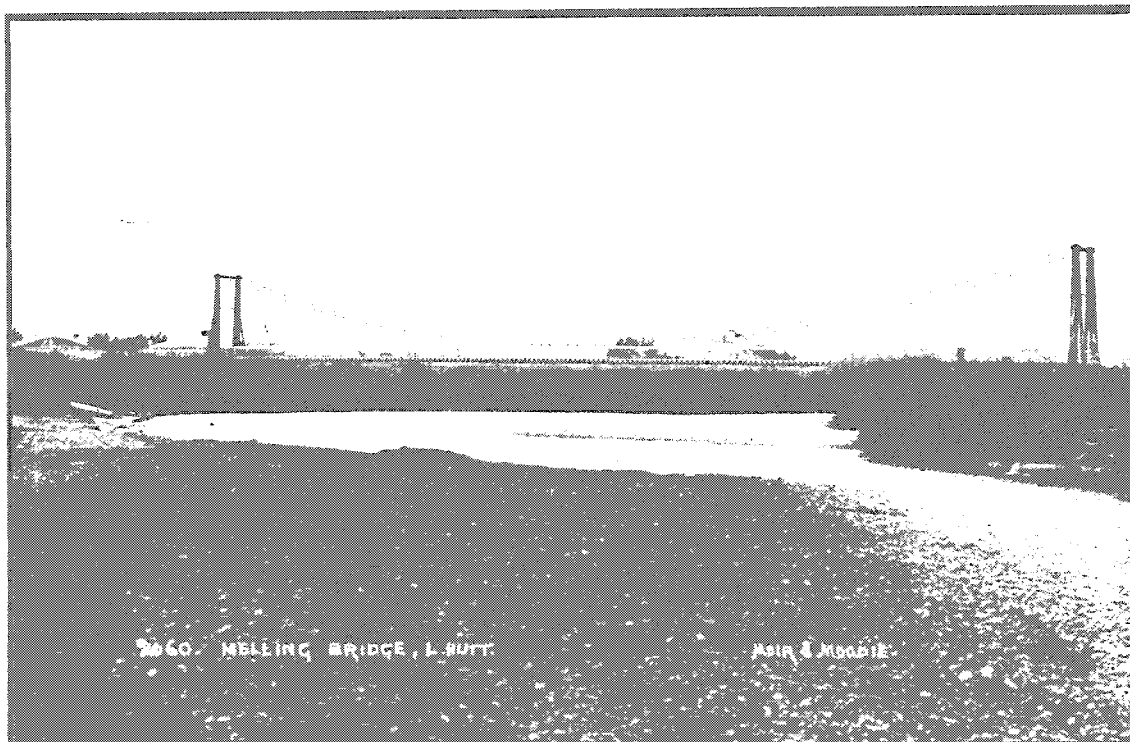


Plate 33: The Melling Suspension Bridge. Source: National Museum neg. B11953

Plates 32 and 33

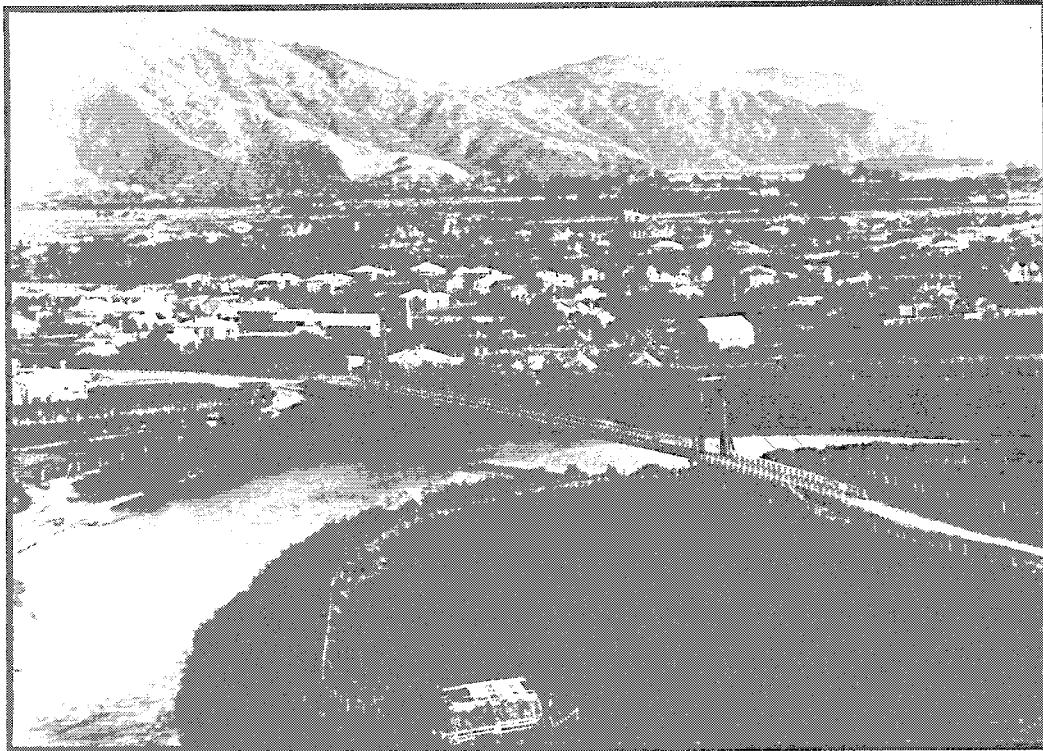
The photograph in plate 32 was taken from beside the Melling Suspension Bridge eastern support looking across to the Western Hutt Road. The bridge spanned this stable bend from 1909 but was eventually replaced in 1956, at that stage when the bridge was in an advanced state of disrepair. Backing-up of flood water associated with the bend would have been part of the mechanism which resulted in the operation of the Boulcott Overflow. The bend served to prevent the movement of river gravels into the Kingdon's Beach extraction area opposite the present upper car park and was of concern to the Hutt River Board for many years.

Following the completion of the new Melling Bridge the Melling Diversion Cut was excavated through the western approach to the Suspension Bridge. The cut served to increase the channel capacity, and so to reduce flood levels and permit the free movement of the river's bedload (although by the time the cut was made the shingle extraction industry was effectively removing all the bedload from the Belmont and Melling licence areas).

Compare plates 32 and 33 and note the level of the flood waters with respect to the stopbank and dwellings in the background of plate 34.

His meaning is unclear since it appears certain that a flood of the magnitude of the 1898 events would have broken out of the channel at Taita and inundated Lower Hutt. The stopbanking works referred to in the Taita area do not appear to have been large enough to prevent operation of the Taita overflow, and substantial logging of the hillsides at about this time was causing widespread erosion and transport of "vast volumes of silt and mud" into the river, increasing the likelihood of flood waters leaving the river channel at Taita.

Apparent inconsistencies in the assessment of the historical floods has led to a reassessment of these events using original survey data and computer modelling techniques. The reader is referred to HRFCSR Report, "Reassessment of Historical Floods". The results of the report are summarised in the figures and tables of Chapter 8. Archive Table 8, "Flood Archives 1900-1924", p. 62 includes the few flood references for this period.



**Plate 34: 1910 photo of Lower Hutt illustrates the HRB concern for stopbank failure at Melling.** Source: Alexander Turnbull Library, S C Smith col. neg. G22763.

**Flood Archives 1900-1924**  
(Abbreviations refer to Archive Table 2, p. 7)

A23: 2 May 1913: LHPP: 460  
Photograph showing flood waters 3' below deck of Melling Bridge.

A24: 8 Sep 1904: HRBminutes  
Following flood, Engineer instructed to set up levels by which the overseer could gauge the height of floods. Flood levels to be recorded in the overseer's diary.

A25: 19 Mar 1907: HRBminutes : 100  
Heavy flood with damage to Pipe Bridge. Engineer reported on urgent works, and extra labour to be employed. Erosion at Masons Gardens, Taita (value £80).

A26: 13 Apr 1909: HRBminutes:  
Flood. Works unaffected.

A27: 6 Apr 1911: HRBminutes: Position not known  
Flood. Engineer to report on lower reaches. Embankment required at Parimans, Belmont.

A28: 28 Aug 1911: HRBminutes  
July flood. Engineer asks if report required - considering it imperative. HRB declines services. Laing-Meason disclaims responsibility for further damage.

A29: 30 Nov 1912: HRBminutes  
Overseer to proceed with work resulting from "recent" flood.

A30: 2 May 1913: HRBminutes  
Chairman reports little damage with respect to size of flood. HRB has no money to effect repairs. Report on damage in upper reaches to be printed.

A31: July 1915: LHPP  
Flood. SSPHRB10 45560 cusecs.

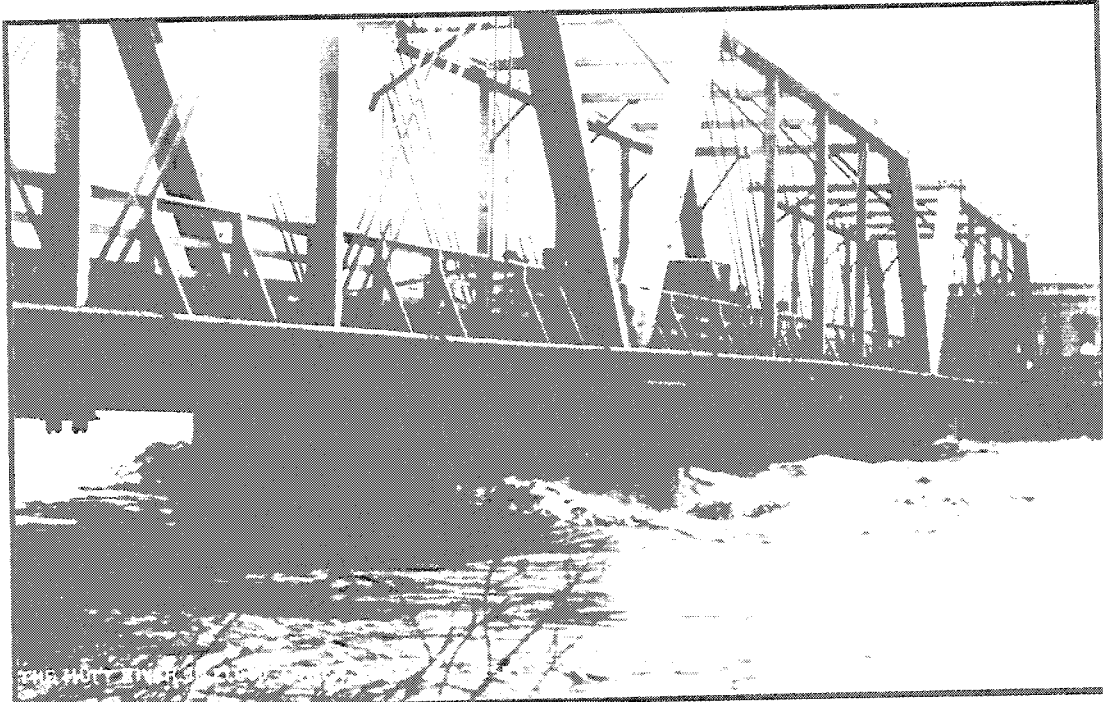
A32: 4 Jul 1921:  
Highest flood since 1915. Low lying areas partially flooded.

A33: 2 Mar 1922:  
Flood, 11' rise.

A34: 1 Nov 24: SSPHRB6  
Flood 10' above normal. With the exception of a small washout (90' LHPP) at Taita Gorge (1140-1170) no damage occurred and channel improved. Recommend: Driven rail protection at Taita Gorge, and cut gorse on island in middle of river to allow scouring.

A35: 18, 19 Dec 1924: SSPHRB6  
Flood to within a few feet of the Hutt Bridge. 2.74 ins rain at Kelburn. Remedy - cable of tethered willows against minor scour.





**Plate 35: Fifth Hutt Bridge, probably depicting the 1915 Flood.** Source: Hutt City War Memorial Library.

